

# *Rosebud - Forsyth* *Solid Waste Study*



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ROSEBUD - FORSYTH

SOLID WASTE STUDY

Prepared By:

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October 1975

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M-M Project No. 386-04-01-45



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### Glossary

#### Appendix "A" - Existing City Ordinances Relating to Solid Wastes

- Part 1 - Garbage
- Part 2 - Animal Wastes
- Part 3 - Refuse in Buildings; Stagnant Water

#### Appendix "B" - State Regulations for Refuse Disposal

- Part 1 - Control of Refuse Disposal Areas
- Part 2 - Rule 16-2.14(2) - S14100 - Refuse Disposal Areas
- Part 3 - Refuse Disposal Districts
- Part 4 - Litter Control - Litter Control Law



## 1.0 Recommendations, Summary, and Conclusions

Environmental pollution includes not only air and water pollution, but land pollution as well. One need not look far to see its effects. More than 90 percent of our Nation's solid waste is directly disposed of on land, the vast majority of it in an unsatisfactory manner. Open and burning dumps, which are all too common, contribute to water and air pollution and provide food, harborage, and breeding grounds for insects, birds, rodents, and other carriers of disease. In addition, these dumps are unsightly and very often lessen the value of nearby land and residences. Citizens are beginning to recognize the need for safe and sanitary management of solid wastes. But the development and implementation of plans will require the combined efforts of citizens, industry, and government.

Solid waste is not only an urban problem, but also a problem for citizens of essentially rural areas such as the Rosebud-Forsyth area. This study reveals that an average of 2.7 pounds per person of solid waste is generated each day in the town of Forsyth. Assuming that 3,500 people live in the Rosebud-Forsyth area and that the Forsyth average holds, these 3,500 people generate approximately 5 tons of waste per day, every day of the year.

At the present time, disposal of this waste is primarily handled at the two existing dumps, one near Forsyth and the other near Rosebud. Examination of these sites reveals that they do not meet state requirements. The problems are





largely due to random dumping and the fact that the fills are not covered over each night. The result is both unsightly and unsanitary. It is evident that some changes must be made.

In choosing between the local sanitary landfill and the transfer method, the overriding consideration is cost. In the case of Rosebud-Forsyth, the use of the transfer method can result in a saving of as much as 30 percent as a result of sharing one landfill with another area. For this reason, it is recommended that the transfer method be selected.

Two locations have been considered as possible disposal sites: Miles City and Colstrip. Each presently has a sanitary landfill which meets state requirements and could handle the refuse. In addition, each has quoted a price of \$4 - \$5 per ton. The Colstrip facility is located somewhat closer, resulting in lower transportation costs. However, Colstrip is somewhat reluctant to receive other communities' waste. It is anticipated that this reluctance could be overcome with a proper presentation of the advantages of a common landfill site. Assuming that this is the case and that a reliable hauler can be found to haul to Colstrip, this is probably the best alternative. Otherwise, transfer to Miles City's landfill is certainly an acceptable alternative.

A 75-cubic yard storage trailer would be more than adequate for refuse storage. At the present time, it would be necessary to haul the trailer to the disposal site two times weekly. As more solid waste is generated due to



population growth, it may become necessary to increase the number of trips to three weekly. Transfer operations could be handled by city employees or by an independent contractor depending primarily on costs. However, it is important that a reliable hauler be employed so the hauling schedule will be maintained. .

Solid waste management is basically a two-phase problem: collection and disposal. Collection refers to the act of picking the waste up from its primary sources (residence, business, etc.) while disposal refers to the act of getting rid of the collected waste. The collection system is influenced by storage method, pick up point requirement, type of waste, type of equipment, available labor, and cost, and may range in complexity from the simplest in which area residents deliver their own solid waste to a central collection point to some relatively complex pick up and compaction system. Any equipment or process which affords greater compaction probably brings long-range economy since more solid waste can be handled conveniently at one time. At present, the conventional rear-loading packer is believed to be the most effective refuse collection equipment currently available for packing refuse.

Currently, refuse in Forsyth is handled through a central system which collects waste from individual homes and businesses and hauls it to the landfill. This system appears to be quite adequate. There is no collection system for residents of Rosebud and the surrounding area; these individuals haul their own refuse. It is recommended that



this individual collection system be retained and that twelve 1.8 cubic yard containers be placed in the area after considering the locations of every residence and business. The Forsyth collection system presently has excess capacity and should be able to empty these containers twice weekly within the present 40-hour work week. If the amount of refuse increases sufficiently in the future, it may be necessary to increase the work week to 48 hours.

There are a number of solid waste disposal methods. However, for an area the size of Rosebud-Forsyth, the only economically feasible method is the sanitary landfill. This may be a local landfill or one located some distance away, in which case a transfer of refuse would be necessary.

If for some reason, the City-County Planning Board feels that transfer operations are not feasible or desirable, a locally-operated sanitary landfill is the alternative. Although it is more costly than transfer, it is still relatively inexpensive. Unfortunately, the term "sanitary landfill" calls forth images of an unsightly open, and frequently burning, dump.. In fact, a sanitary landfill is an engineered method in which solid wastes are disposed of by spreading them in thin layers, compacting them to the smallest practical volume and covering them with earth each day in a manner which minimizes environmental pollution. A sanitary landfill is not only an acceptable method of waste disposal, it is also an excellent way to make otherwise unsuitable or marginal land valuable.





Proper site selection is an important step toward establishing an acceptable sanitary landfill and can eliminate many future operational problems. The following factors should be considered: land area requirement, zoning restrictions, accessibility, haul distance, cover material, geology, and climate.

It is estimated that a 16- to 18-acre site would be necessary to serve the Rosebud-Forsyth study area for a 20-year period. Two sites have been chosen for closer examination: Site #1, located in the northwestern portion of the study area near Windmill and Site #2 in the southwestern portion, south of Rosebud and Forsyth and about midway between them. Both sites are on state lands and have desirable characteristics for sanitary landfill operations. Both would require improvements before disposal operations could begin, including general clearing, road construction, fencing, and signage. Both meet geographical and topographical requirements, are close to the collection route and are accessible to all vehicles which will use the facility. In addition, each has room for expansion after the 20-year proposed acreage is exhausted.

Use of Site #1 would result in a slightly lower cost, approximately 3 percent less than Site #2. This is due to differences in road construction costs and the fact that Site #2 would require snow removal. All other things being equal, Site #1 should be selected. However, the choice may depend upon availability of the land.



If a locally-operated sanitary landfill is chosen as the method of waste disposal, special attention should be paid to its appearance. The operation is the only phase of the project seen by the public. Consequently, public acceptance of the plan, design, and operation will be based solely on the operation. Other aspects of plan, design, and operation will not cause any problems if proper care is taken in engineering the project.

In summary, the following are the recommendations of this study:

- 1) The Town of Forsyth should retain existing solid waste storage and collection systems, i.e., citizens should store refuse in suitable containers for collection, which should be at least bi-weekly to control undesirable aspects such as flies and odors. If any problems develop due to careless storage by residents of the community, a public education program should be undertaken. Should this fail, new city ordinances should be considered.

- 2) 1.8 cubic yard refuse storage containers should be provided for the remainder of the study area to be emptied twice weekly by collection crews from Forsyth. Individuals should haul their own refuse to the containers. Should unsightly messes occur in the areas around the containers, a public education program should be able to alleviate the problem in a community of this small size.

- 3) Actual waste disposal should be accomplished by transfer to Colstrip or Miles City depending upon disposal and hauling costs.



## 2.0 INTRODUCTION

### 2.1 General

This report has been prepared for the Rosebud - Forsyth City - County Planning Board to advise the Board on solid waste collection and disposal for Forsyth and the surrounding area.

Historically, Rosebud County's economy has been dominated by agriculture, but agriculture's relative importance is decreasing due to extensive coal development. The existing economy is based on agriculture, mining, transportation and utilities. The increasing importance of the mining sector will mean an influx of people. Providing community services, including waste disposal for these people has become a concern for community officials.

### 2.2 Study Purpose and Scope

The major objective of this report is to study alternate methods of solid waste collection and disposal within the designated planning area, to provide means of administering these wastes in a legal, economical, and effective manner.

### 2.3 Study Area

The study area is depicted in Figure 2.3 and includes all lands shown within the boundary. The communities of Forsyth and Rosebud are the main population centers within







STUDY AREA BOUNDARIES

Scale 1" = 6 Miles

Figure 2.3





this area. Also to be considered in the study will be the individual farms located in the area of study, which includes 24 miles from east to west and 18 miles from north to south.

#### 2.4 Population in Area

The study area's major population center is located at Forsyth. Rosebud also has a population which must be considered. Figure 2.4 shows the projected population for the study area from 1975 to 1995. The graph indicates a rapid population increase which is the result of the growing economy due to Colstrip operations. The study is based upon population growth for the next 20 years, which was calculated at a rate similar to Rosebud County as a whole. If growth in the area served by the sanitary landfill site is greater than anticipated, the generated solid waste is assumed to increase in proportion to the actual growth.

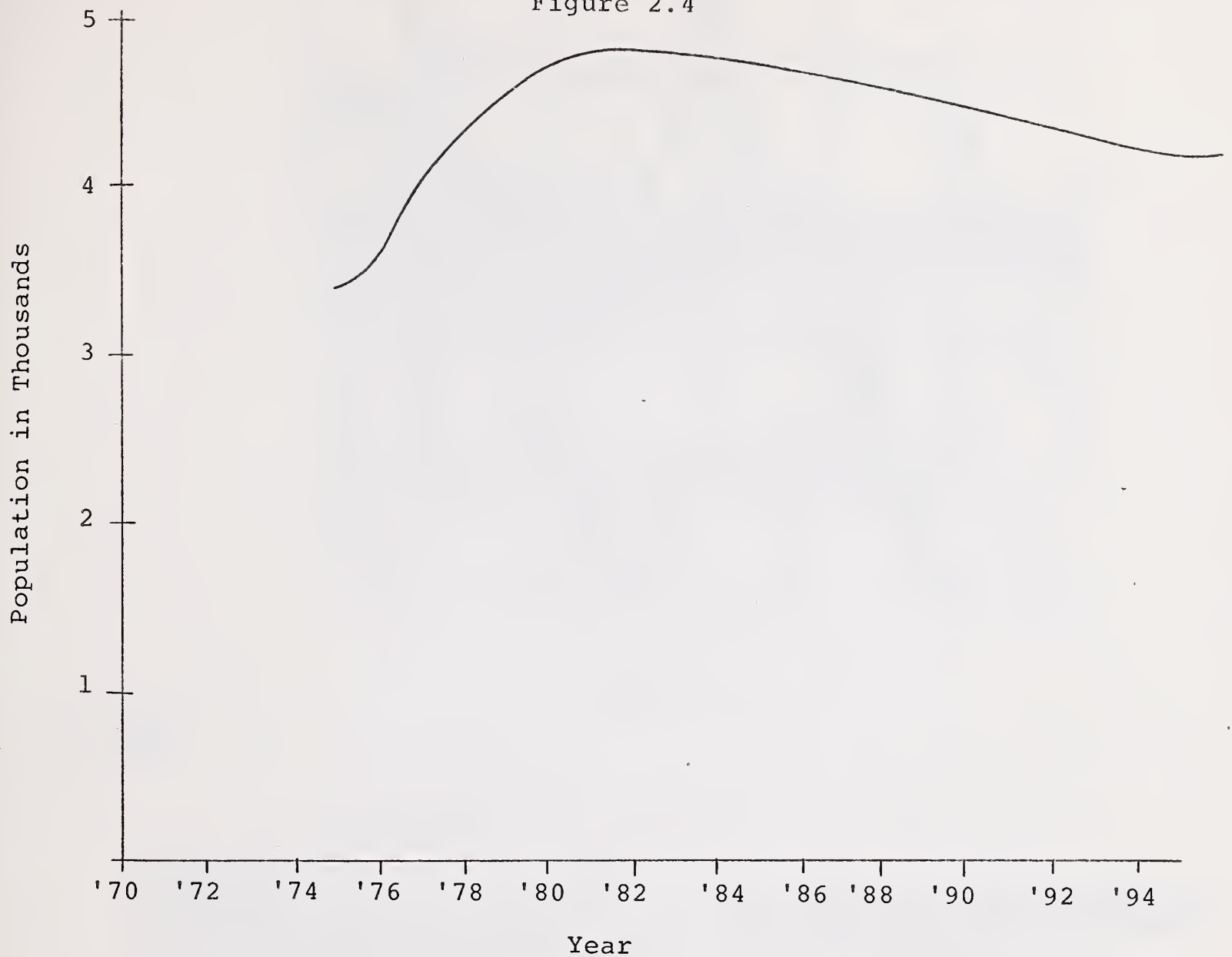
#### 2.5 Geology

The geological characteristics of the site shall be determined by on-site testing or from earlier reliable survey data.

Exploratory geological investigations are one of the most important studies required in selecting a site for a sanitary landfill. From such investigations, it can be determined if the cover material of suitable quantity is available. Such investigations also will permit evaluation of geological factors that influence ease of excavation, water pollution, and lateral gas movement.



Figure 2.4



1. Population area includes Forsyth, Rosebud, and other groups in the study area.
2. Population study assumes units 3 & 4 at Colstrip will exist.
3. Average 20-year population is 4,450.



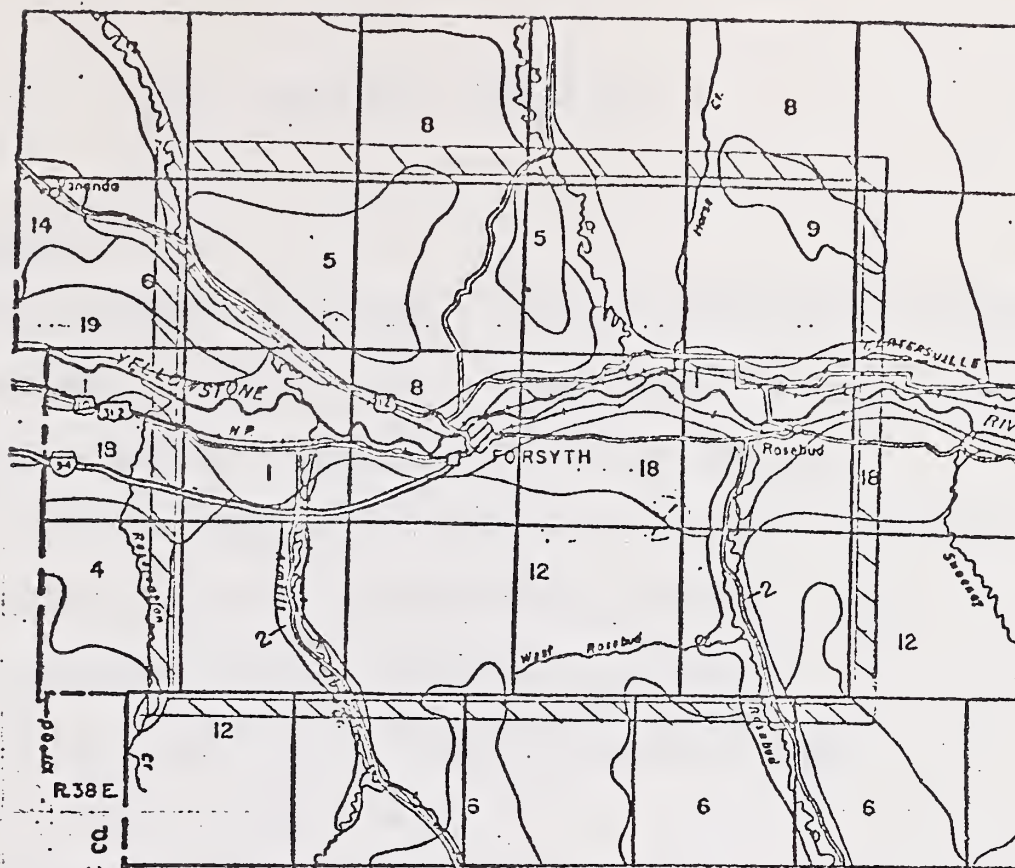


Figure 2.5

#### SOIL ASSOCIATIONS

##### SOILS OF THE FLOOD PLAINS

- 1** Nearly level to gently sloping, deep, well-drained soils on the flood plains.
- 2** Nearly level to gently sloping, deep, well-drained soils on the flood plains. (Soils of this association are similar to those in association number 1 except that they have a colder temperature regime.)

##### SOILS OF THE SANDSTONE AND SHALE UPLANDS

- 3** Gently sloping to steep, shallow and moderately deep, well-drained soils of the sandstone and shale uplands.
- 4** Moderately sloping to steep, shallow and moderately deep, well-drained soils of the sandstone and shale uplands.
- 5** Level to steep, shallow and moderately deep, well-drained soils of the sandstone and shale uplands.
- 6** Moderately sloping to steep, shallow and deep, well-drained soils of the sandstone and shale uplands. (Soils of this association are similar to those in association number 4 except that they have a darker colored surface layer.)
- 7** Gently sloping to very steep, shallow and moderately deep, well-drained soils of the sandstone and shale uplands. (Soils in this association are similar to those in association 3 except that they have a warmer temperature regime.)
- 8** Gently sloping to steep, shallow and deep, well-drained soils of the sandstone and shale uplands. (Soils in this association are similar to those in association 7 except that they are in a higher precipitation zone.)
- 9** Nearly level to moderately steep, shallow and deep, well-drained soils of the sandstone and shale uplands.
- 10** Moderately sloping to steep, shallow and moderately deep, well-drained soils of the sandstone and shale uplands. (Soils of this association are similar to those in association number 4, 6, 11, 13, and 15 except that they have a colder temperature regime.)
- 11** Moderately sloping to steep, shallow and deep, well-drained soils of the sandstone and shale uplands. (Soils of this association are similar to those in association number 4, 6, 13, and 15 except that they have a lighter colored surface layer.)

- 12** Gently sloping to steep, shallow and deep, well-drained soils of the sandstone and shale uplands. (Soils in this association are similar to those in association number 7 except that they have lighter colored surface layers.)
- 13** Moderately sloping to steep, moderately deep and shallow, well-drained soils of the sandstone and shale uplands. (Soils in this unit are similar to those in association numbers 4, 6, and 11 except that they are sandy soils.)
- 14** Nearly level to strongly sloping, deep, well-drained soils of the sandstone and shale uplands. (Soils in this association are similar to those in association number 9 except that they are in a lower precipitation zone.)
- 15** Moderately sloping to steep, moderately deep, well-drained soils of the sandstone and shale uplands. (Soils in this association are similar to those in association numbers 4, 6, 11, and 13, except that they are moderately deep soils.)

##### SOILS OF THE RED SHALE HILLS

- 16** Gently sloping to very steep, deep, moderately deep and shallow, well-drained soils of the red shale hills.
- 17** Moderately sloping to very steep, moderately deep and shallow, well-drained soils of the red shale hills. (Soils in this association are similar to those in association 16 except that they have a warmer temperature regime.)

##### SOILS OF THE HIGH TERRACES

- 18** Nearly level to moderately sloping, deep and moderately deep, well-drained soils of the high terraces.
- 19** Level to gently rolling, deep, well-drained soils of the high terraces. (Soils in this association are similar to those in association number 13 except that they are saline.)

This map is intended for general planning. Each delineation may contain soils different from those shown on the map. Use on site inspection for more detailed decisions.





### 3.0 EXISTING CONDITIONS

#### 3.1 General

Field surveys of existing refuse collection operations were conducted in June, 1975. These field surveys were conducted to aid in evaluation of the following:

- A. Average number and type of containers at each stop and the corresponding collection time.
- B. Average quantity of refuse per stop.
- C. Costs per ton for collection operations.
- D. Cost per service stop.
- E. Adequacy of existing services.

Results of these surveys are shown in Section 3.

The volume and weight of waste per container may vary greatly. It is possible for one container to be loaded to a weight equal to the combined weight of three other partially loaded refuse containers. When quantities are small, a collector may load two containers simultaneously. In other cases he may have such difficulty with one container that the actual time exceeds the average time for two or more.



## 3.2 Collection

### 3.2.1 Forsyth

#### 3.2.1.1 Collection System

At present, refuse collection in Forsyth is handled by two collection trucks. Refuse is collected from residential areas weekly from containers located in the alleys.

This system seems to be quite adequate. Table 3.2.1.1-A gives time and mileage data for the Forsyth collection truck. 75 percent of the time the 16-yard collection truck picks up the refuse. The remainder of the time both the 16-yard and the 13-yard collection trucks are used. The collection schedule will permit an increase in the use of collection facilities without affecting the present 40-hour week.

Table 3.2.1.1-B gives the number of occurrences for specific time increments for pick up time. The table shows there is a considerable spread in the time which it takes for collection of refuse per stop.

Table 3.2.1.1-C gives the time increment for travel between stops. Nearly 50 percent of the travel time between stops is less than 30 seconds.

Table 3.2.1.1-D is a summary of containers used and the average number of containers per stop. The majority of containers are standard cans.

Figures 3.2.1.1-A, B, C, D show the number of occurrences in relation to items per stop, time per service stop for residential collection, time per service stop for mobile containers, and time per service stop for residential and commercial collection.



Table 3.2.1.1-A

DATA SUMMARY  
REFUSE COLLECTION OPERATIONS  
CITY OF FORSYTH

Dates: June 10, 11, and 12, 1975

Climate: Clear and Warm

Crew Size: Two

Equipment Description:

Body Manufacturer:	Heil
Capacity:	16 Cubic Yards
Type:	Rear Loading Compactor
Hopper:	1.4 Cubic Yards
Chassis:	Ford F 750 //

I. Total Times and Mileage

	<u>Minutes</u>	<u>Miles</u>
Yard to Route	7	0.4
On Route (includes breaks)	1,239	38.3
*Route to Disposal Site	62	20.3
*Disposal Site to Route	54	19.7
Route to Yard	<u>11</u>	<u>0.8</u>
Totals for Three Days	1,373	79.5

\*4 Loads to Disposal Site





Table 3.2.1.1-B

## II. Incremental Times

<u>Time Increment</u>	<u>Number of Occurrences</u>
0-0.20	48
0.21-0.40	61
0.41-0.60	89
0.61-0.80	85
0.81-1.00	76
1.01-1.20	49
1.21-1.40	27
1.41-1.60	23
1.61-1.80	20
1.81-2.00	24
Over 2.00	39

Table 3.2.1.1-C

## III. Travel Time Between Stops

<u>Time Increment</u>	<u>Number of Occurrences</u>
0-0.10	28
0.11-0.20	121
0.21-0.30	117
0.31-0.40	59
0.41-0.50	46
0.51-0.60	23
0.61-0.70	16
0.71-0.80	11
0.81-0.90	26
0.91-1.00	15
1.01-1.50	48
Over 1.50	36



Table 3.2.1.1-D

Container Summary

Total Number of Mobile Containers:	1,288
Total Number of Cans:	622
Total Number of Boxes:	269
Total Number of Bundles:	71

Average Number of Mobile Containers/Stop:	0.13
Average Number of Cans/Stop:	2.45
Average Number of Boxes/Stop:	1.35
Average Number of Bundles/Stop:	0.51



CITY OF FORSYTH  
Number of Items per Stop

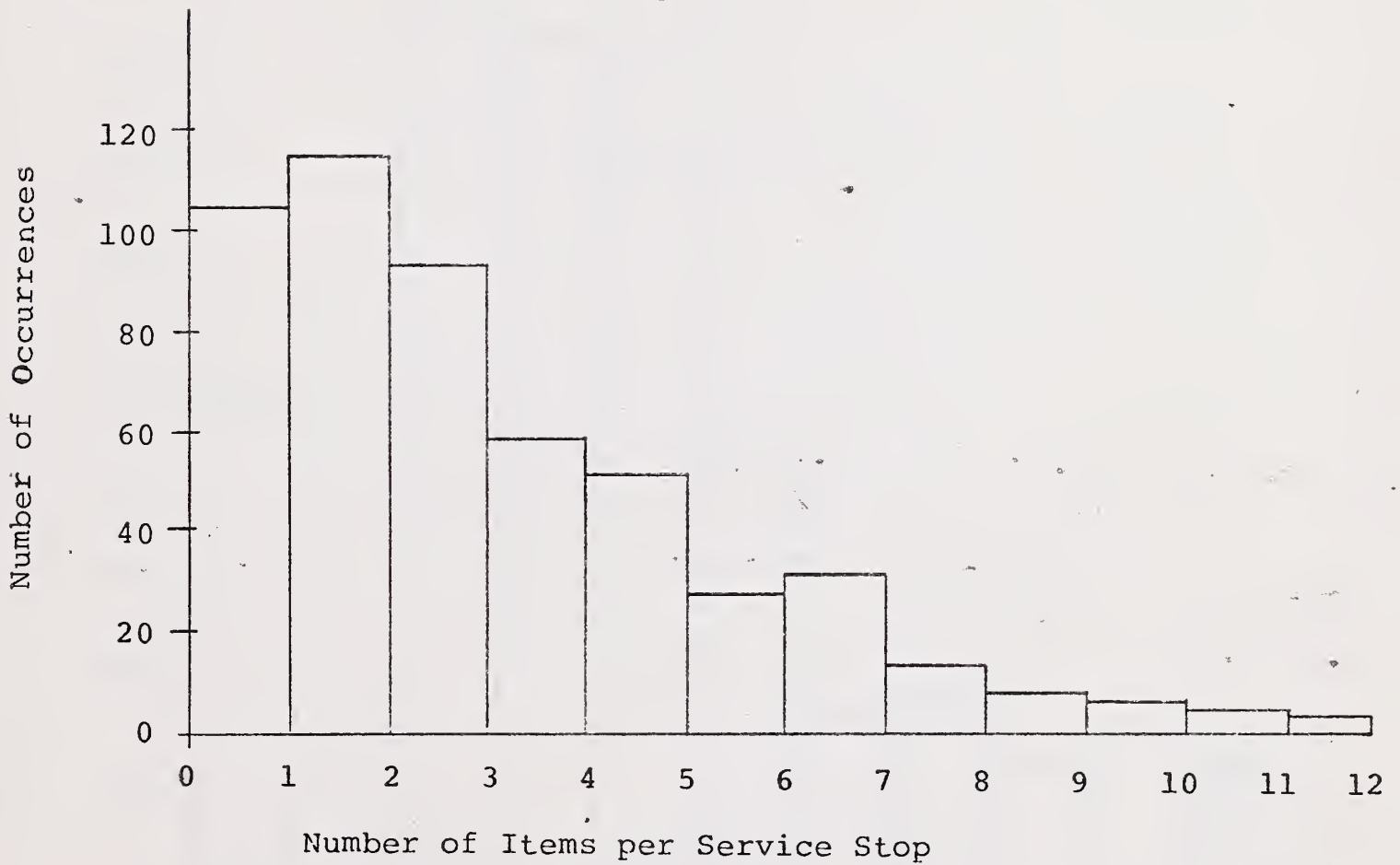
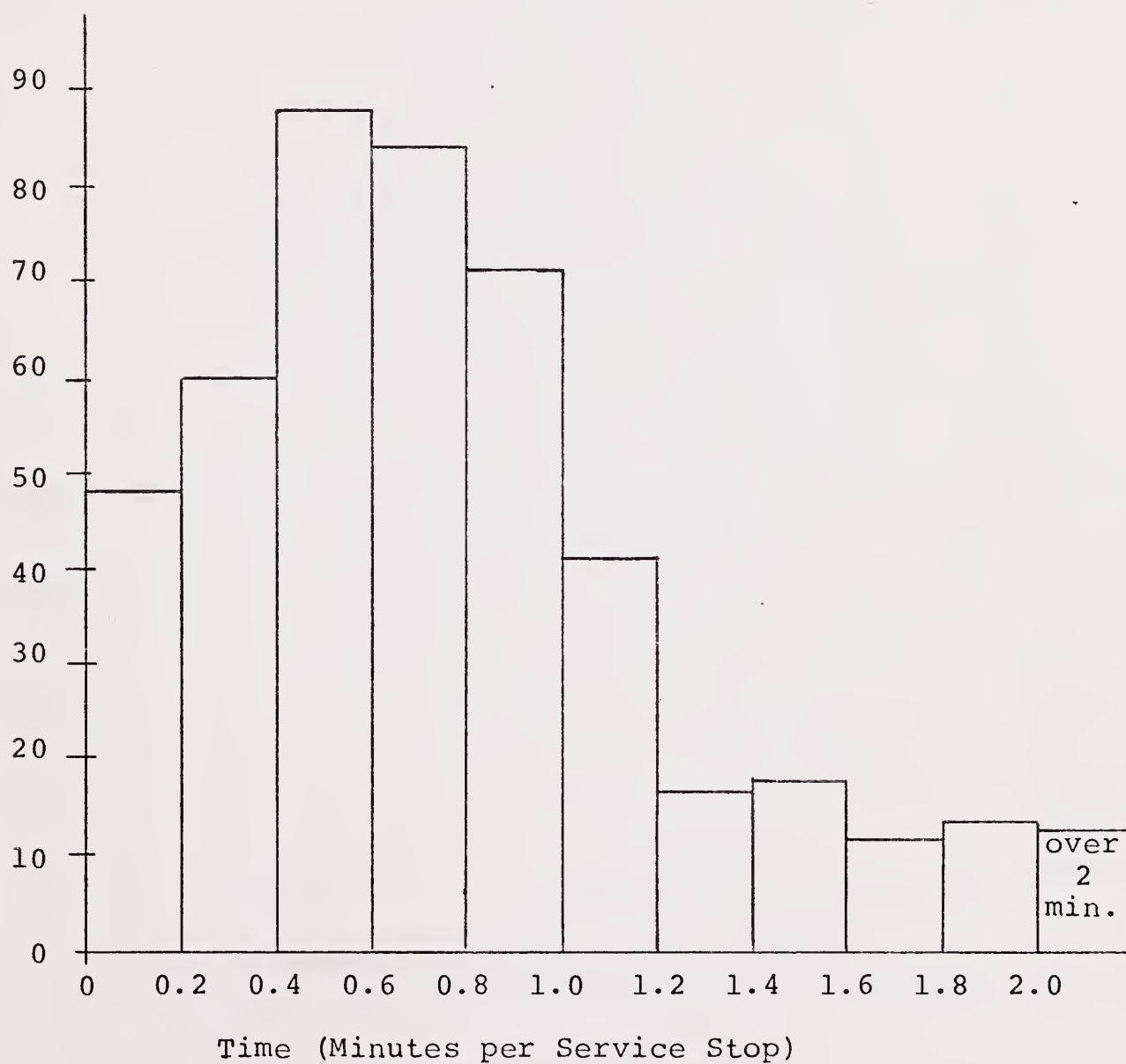


Figure 3.2.1.1-A





CITY OF FORSYTH  
Residential Collection



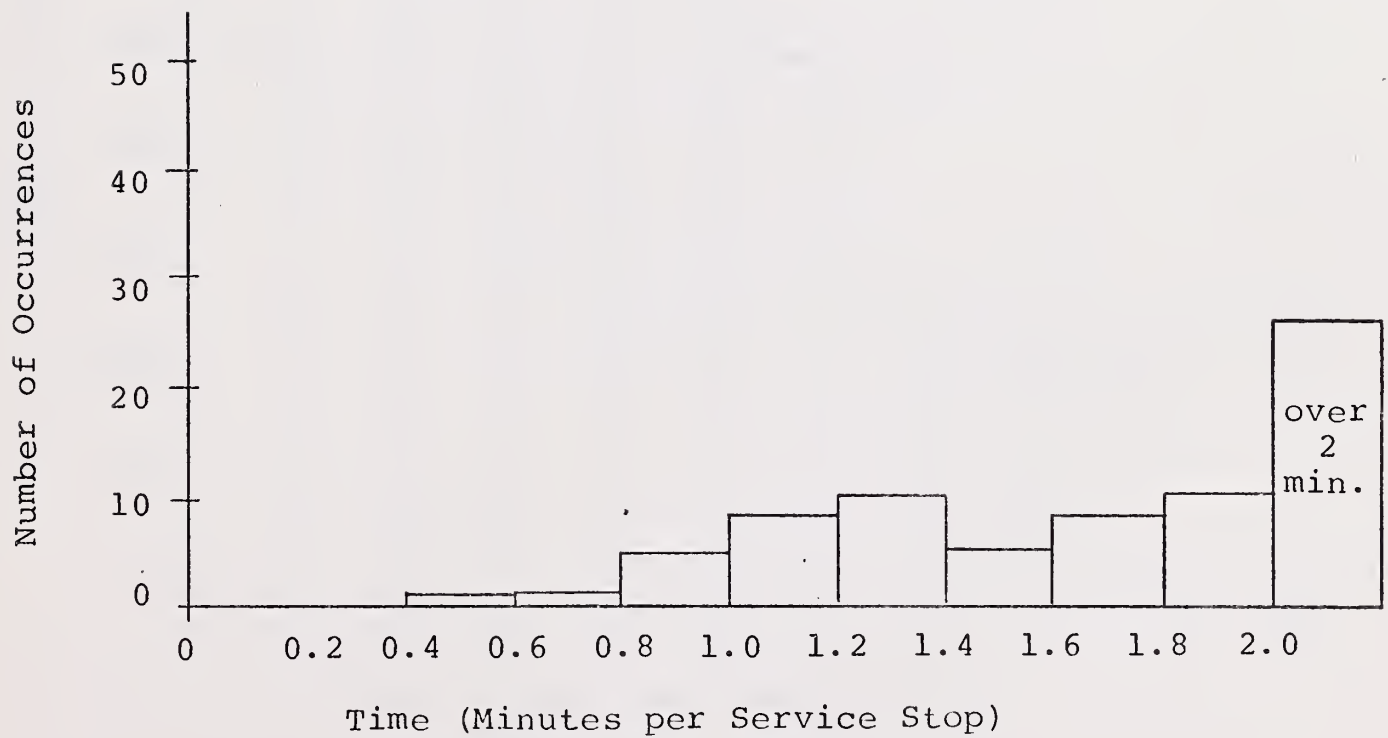
Residential - Any stop with cans, boxes, and bundles

Commercial - Any stop with 1 or 1½ c.y. mobile containers

Figure 3.2.1.1-B



CITY OF FORSYTH  
Commercial Collection



Residential - Any stop with cans, boxes, and bundles

Commercial - Any stop with 1 or 1½ c.y. mobile containers

Figure 3.2.1.1-C



CITY OF FORSYTH

Residential & Commercial Collection

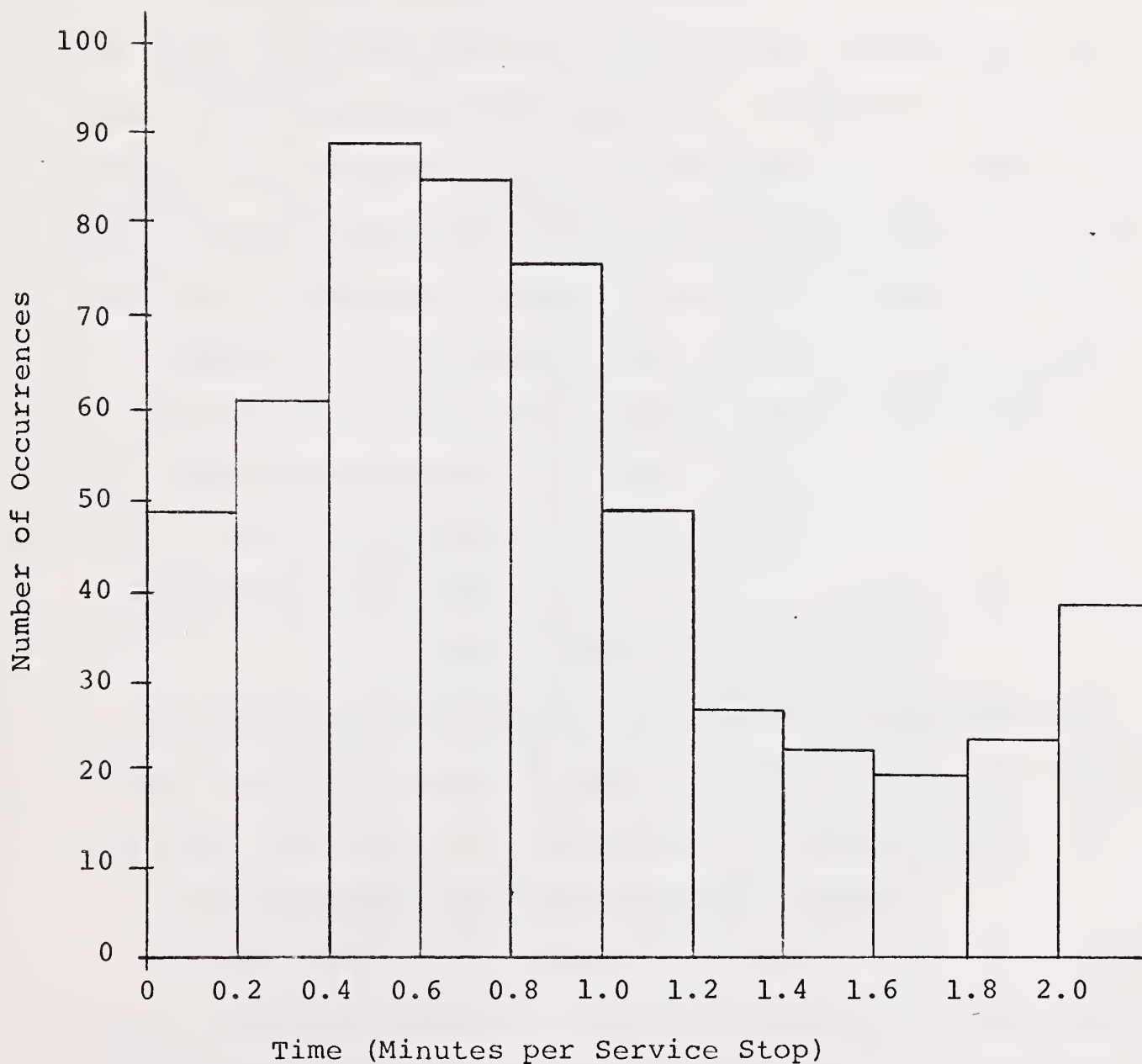


Figure 3.2.1.1-D





### 3.2.1.2 Collection Costs

The present collection costs for Forsyth are comparably low in relation to other communities collection costs. Table 3.2.2 demonstrates how the costs for collection services are determined. The change to residential users is \$30 per year.

Charges for services to a business two times weekly are \$3 for the first can, \$2 each for the second and third cans, and \$1 for each additional can. Charges for daily pickups are \$3 for the first can, \$2 each for the next 6 cans, and \$1 each for any additional cans. A one-yard bin is equivalent to 7 cans and a 1½-yard bin is equivalent to 10 cans.

Example: If a business had a 1½-yard bin and wanted it emptied daily, the following charge would apply.

$3+2+2+2+2+2+2+1+1+1 = \$18$  per month

$\$18 * 12 \text{ months} = \$216$  per year

For bins minus 10%

is \$22 = \$194 per year

If cans only are emptied, the charge for services is \$4 for the first can and \$2 each for additional cans. When only cans are used, a 10% additional charge is added.

### 3.2.2 Rosebud's Refuse Collection System

At the present time, there is no refuse collection system for the Rosebud community. There is, however, an open dump located south of Rosebud near Interstate 94, to which individuals of the community haul their refuse.

### 3.2.3 Existing Practices for Remainder of Study Area

Individuals not included in the established collections system haul their refuse to the disposal site by pickup. As a result, random dumping often occurs because of the lack of supervision.



# COLLECTION COST SUMMARY

Month		Equipment & Maintenance*	Depreciation**	Labor	Total Cost	Tons	Cost/Ton
August	1974	\$203.00	\$350.00	\$2,108.00	\$2,661.00	135.6	\$19.62
September	1974	203.00	350.00	2,108.00	2,661.00	113.8	23.38
October	1974	203.00	350.00	2,034.22	2,587.22	159.2	16.25
November	1974	203.00	350.00	2,192.32	2,740.32	136.1	20.13
December	1974	203.00	350.00	2,108.00	2,661.00	120.4	22.10
January	1975	203.00	350.00	2,108.00	2,661.00	127.0	20.95
February	1975	203.00	350.00	2,023.68	2,576.68	119.4	21.57
March	1975	203.00	350.00	2,192.32	2,745.32	121.0	22.69
April	1975	203.00	350.00	2,192.32	2,745.32	135.3	20.29
May	1975	203.00	350.00	2,108.00	2,661.00	149.6	17.79
June	1975	203.00	350.00	2,108.00	2,661.00	138.0	19.28

Average collection cost/ton = \$20.36

Table 3.2.1.2

\* Equipment and maintenance costs for collection trucks are calculated using \$0.35 per mile.

\*\* Depreciation and investment costs for collection vehicles.

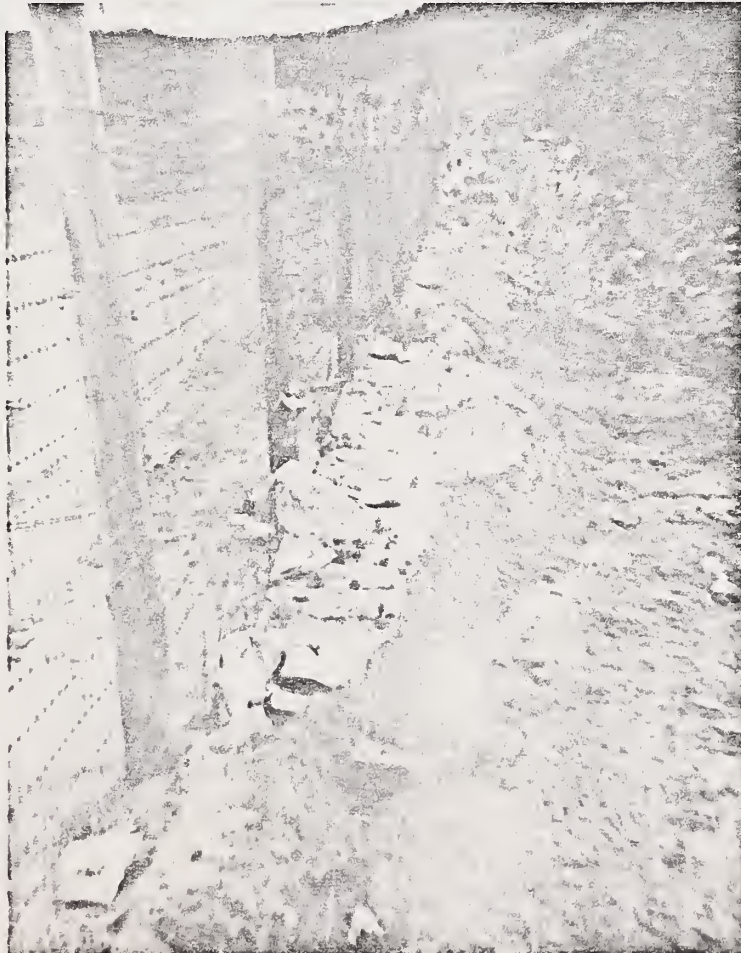


### 3.3 Disposal

At the present time, refuse disposal in the study area is handled in two ways: Refuse from Forsyth is dumped in a sanitary landfill outside the town and refuse from the remaining area is dumped in an open dump near Rosebud. Neither of these facilities meet state requirements.

#### 3.3.1 Existing Landfill (Forsyth)

The existing landfill at Forsyth (see Figure 3.3.1) is not adequate in meeting the needs of the people of the Forsyth area. The site is attended only four hours per day, and the dumping grounds do not have a gate on the entrance to prevent random dumping. As a result, a proper coverage is not accomplished and the refuse is subject to winds, creating an unsightly area.







### 3.3.2 Existing Landfill Operation Costs

Operation costs for the existing landfill are summarized in Table 3.3.2. When examining the present cost per ton of refuse disposal, one finds that the costs of the proposed disposal methods are only slightly greater. Presently, the attendant is present at the site four hours per day. The major cost of the operation is the pit excavation.



# LANDFILL COST SUMMARY

Month	Equipment* & Maintenance	Pit Exc.	Labor	Total Cost	*** Tons	Cost/Ton
Aug. 1974	115.08	1,000.00	442.68	1,557.76	135.6	11.49
		**				
Sept. 1974	637.57	1,300.00	168.64	2,106.21	113.8	18.51
		**				
Oct. 1974	232.22	1,300.00	421.60	1,953.93	159.2	12.27
		**				
Nov. 1974	368.56	1,300.00	337.28	2,005.84	136.1	14.74
		**				
Dec. 1974	233.06	1,300.00	376.80	1,909.86	120.4	15.86
		**				
Jan. 1975	276.90	1,300.00	432.14	2,009.04	127.0	15.82
		**				
Feb. 1975	734.49	1,300.00	337.28	2,371.77	119.4	19.86
		**				
Mar. 1975	167.60	1,300.00	400.52	1,768.12	121.0	14.76
		**				
Apr. 1975	121.20	1,300.00	400.52	1,821.72	135.3	13.46
		**				
May 1975	89.60	1,300.00	379.44	1,769.04	149.6	11.83
		**				
June 1975	501.06	1,300.00	358.00	2,159.26	138.0	15.65

Table 3.3.2-A

\* Labor at \$4.35 + 21% fringes = \$5.27, included equipment depreciation.

\*\* \$15,600 to dig pit, cost of \$1,300.00 per month amortized from November 1, 1974 to November 1, 1975 or life of pit. (\$1,300.00/Mo).

\*\*\* 550 pounds/cubic yard.



## 4.0 SOLID WASTE CHARACTERISTICS

### 4.1 General

The design, implementation, and operation of efficient and economical solid waste collection, handling, transport, and disposal systems require accurate information on the quantities and characteristics of the solid waste.

Various estimates have been made of the quantity of solid waste generated and collected per person per day. As shown in Tables 4.1-A and 4.1-B, the amount collected was found to average 5.32 pounds per person per day. These averages are subject to adjustment dependent on local factors, including time of year, habits, and economic status of the people.

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Table 4.1-A  
AVERAGE SOLID WASTE COLLECTED, 1968  
(Pounds Per Person Per Day)

Solid Waste Type	Urban	Rural	National Average
Household	1.26	0.72	1.14
Commercial	0.46	0.11	0.38
Combined	2.63	2.60	2.63
Industrial	0.65	0.37	0.59
Construction	0.23	0.02	0.18
Street & Alley	0.11	0.03	0.09
Miscellaneous	0.38	0.08	0.31
TOTALS	5.72	3.93	5.32

Source: Anton J. Muhich, "Sample Representatives and Community Data", Proceedings, Institute for Solid Wastes, American Public Works Association, Chicago, Ill., 1968.

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Table 4.1-B  
RELATION OF DOMESTIC SOLID WASTE PRODUCTION  
TO POPULATION DENSITY

<u>Person/Sq. Mile</u>	<u>Lb./Capita/Day</u>
10 - 200	2.4- 3.1
200 - 2,000	2.8 - 3.8
2,000 - 7,000	3.2 - 4.5
7,000 - 10,000	5.0 - 5.5

Source: Garret P. Westerhoff & Robert M. Gruninger,  
"Population Density vs. Per Capita Waste Production",  
Public Works (Feb. 1970), p. 87.

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#### 4.2 Solid Waste Composition

When studies were made in the Forsyth area, it was found that an average of 2.7 pounds per day of solid waste was generated for each person. For this study 3.0 pounds per day per person will be used to calculate volumes of solid waste generated, since as a general rule, the average volume of solid waste generated per person increases with the increase of population growth.

The density of the solid waste collected in the Forsyth area was found to be 550 pounds per cubic yard after collection truck compaction. The loose weight of the refuse that is to be picked up for disposal will be approximately 350 pounds per cubic yard.





## 5.0 ESTABLISHED REFUSE STORAGE METHODS

### 5.1 General

Storing solid wastes properly while they await collection is necessary so that they do not cause unsightly messes or attract rats and flies. The appearance of a community depends a great deal on the storage of solid wastes.

A 1967 study in California showed that household solid waste containers have a high fly production rate and that twice-a-week collection as opposed to once-a-week collection reduces the total number of flies by more than 75 percent. The Bureau of Solid Wastes Management of the U.S. Public Health Service strongly urges that all solid wastes which contain garbage be collected at least twice a week.

It is usually the homeowner's responsibility to supply enough containers for his solid wastes and keep them in good condition. In public areas, such as bus stops, shopping centers, and parks, the local government should supply solid wastes receptacles. Local government is responsible for defining "proper storage" and enforcing these standards.

### 5.2 Cans (Metal and Plastic)

The traditional tapered galvanized steel can has remained the most widely used household solid wastes can. Can size should be such that when loaded it weighs no more than 80 pounds. This is usually a 20-gallon to 30-gallon container. 55-gallon drums are not acceptable since they are cumbersome and when loaded are too heavy for one man to pick up safely. Cans should be protected by storing them on a concrete base,



or even better, by elevating them on a metal frame about 18 inches above the ground.

Plastic containers are usually lighter, easier to clean, and rust-proof. However, many plastic containers cannot withstand freezing temperatures without cracking, and they are more susceptible to fire damage than metal cans. Both plastic and metal containers should have two secure handles, and tight lids without holes to keep out insects and rainwater.

### 5.3 Sacks (Paper and Plastic)

Several disposable plastic and paper refuse sack systems have been developed. Most plastic bags are designed for use as can liners, although some communities use them instead of cans or for special wastes such as leaves, grass, and other yard wastes. Paper sacks have many of the same advantages as plastic bags, and are somewhat less expensive.

#### Use of Plastic and Paper Sack Systems

<u>Advantages</u>	<u>Disadvantages</u>
1. They are disposable and so do not have to be cleaned.	1. They are prey to attack by animals if no metal guard is used.
2. They speed collection since the collector does not have to carry a container back to the yard.	2. Arrangements are necessary to make holders and container guards available.
3. Spillage is lessened.	3. The user or local government must pay for a continuing supply of bags.
4. The number of bags set out is easily adjusted to immediate need.	4. The homeowner must be instructed in the use of holder and the storage requirements.
5. They are lightweight and easy to handle, reducing back injuries and insurance costs.	5. Closure of overfilled bags is often faulty.
6. Collection is quieter than with the can system.	6. The bag is an item of solid waste itself.



With the refuse sack system, local government may supply homeowners with bags and racks or act as an agent selling to the owners so that the sacks will always be conveniently available.

#### 5.4 Mobile Detachable Containers

The containerized storage system (mobile detachable unit) is best used for quantity waste producers and for wastes which are hard to handle. In most places, replacement of 30-gallon can or 50-gallon drums with large, 4- to 20-cubic yard or even 40- to 50-cubic yard containers has proven convenient and efficient. It especially speeds collections of large amounts of waste from commercial and industrial establishments. These containers are usually supplied by the collector.

For collection, the container is mechanically lifted, emptied into the compaction truck, and replaced. Some early designs still in use require the container itself to be physically transported to the disposal site, emptied, and returned to the collection point; this wastes time and may leave the commercial establishment without a storage unit several hours on collection day. Other systems use large piggyback containers which fit on a flatbed truck. When the container is full, the truck brings an empty bin and takes the full one to the disposal site.

The containerized storage system is appropriate for commercial, industrial, agricultural, and apartment solid wastes. In rural and sparsely settled areas, containers are sometimes placed at convenient roadside locations for waste storage since home-to-home collection costs may be prohibitive.







They must be cleaned regularly to minimize odor and insect infestation, and solid wastes must be collected on a regularly scheduled basis.

To save storage space, some bins are equipped with their own compaction devices. The greater the compaction the fewer the storage units required. Where air pollution control regulations have outlawed the use of incineration in apartment buildings, these compacting bins can often replace the burner in the same space. In planning this kind of operation, care must be paid to accessibility of the storage units and the servicing of the compactor. Other systems reduce volume by shredding or pulping.

One unacceptable method is pit storage, where garbage can holders are built into the ground. Garbage spilled in the pit is rarely cleaned out, causing odors and harboring flies. This method is unacceptable since only small cans can be lifted from below ground level; many cans are required; and collectors must use improper positions to lift containers. During cold winter months, recessed containers often become frozen in the hole and require heat to thaw them out.

### 5.5 Recommendations

Storage methods in Forsyth seem to be generally adequate at this time. As the population grows, it may be necessary to reexamine the question and make adjustments at that time.

Since refuse is not collected from individual residences in the remainder of the study area, some provision must be made for solid waste storage. It is suggested that a



containerized storage system be used. Containers should be located where travel distance for users is reasonable. This will be a maximum of ten miles. Each container should be placed on a concrete slab to eliminate problems with mud and other unsightly conditions. The concrete slab is the preferred treatment because of the ease with which it can be cleared and maintained.

At present, Rosebud has a population of 300. These people, along with the local ranchers, generate approximately 26 cubic yards of refuse weekly. Assuming bi-weekly collection, seven 1.8 cubic yard containers should be sufficient.

In addition, there are two trailer courts which must be considered, one owned by Kevin Brewer and the other by Terry Essex. The Brewer trailer court presently contains 65 trailers and generates approximately ten cubic yards of solid waste weekly. Three 1.8 cubic yard containers should be placed at the court and emptied two times weekly. If Colstrip Units 3 and 4 become operational, the court could grow to 200 trailers. Growth should be monitored to determine when additional storage containers are needed. The Essex trailer court houses 40 trailers and generates six cubic yards of solid waste weekly. Two 1.8 cubic yard containers should be placed at this site.



## 6.0 ESTABLISHED REFUSE COLLECTION METHODS

### 6.1 General

The collection system is influenced by storage method, pickup point requirement, kind of waste, kind of equipment, labor available and cost. The service provided influences the crew size per truck, as does truck capacity and travel time. Any collection system should have prescribed routes and days for collection.

### 6.2 Residential Collection Methods

If standard metal cans, refuse sacks, or plastic bags are used, there are five basic methods of residential waste pickup service: curb service, alley service, set-out/set back service, set-out service, and backyard service.

With curb service, the homeowner places his solid waste container(s) at the curb on the scheduled day. Pickup men dump the waste into the collection vehicle and replace the container at the curb. The homeowner must return the container to its normal storage area.

With alley service, solid waste containers are stored on the homeowner's property at the alleyline. Pickup men empty the containers into the collection vehicle and replace the container in its normal storage area next to the alley.

With set-out/set-back service, "set-out" men go house to house taking full trash cans from yard to curblane; other men stay with the truck to empty cans; "set-back" men return the empty cans to the owner's yard.





With set-out service, the collector brings the waste can from the yard to curb and empties it. The homeowner carries the empty container back to the yard's storage area.

With backyard carry service, the collector carries a tote bin or burlap cloth to the yard, empties the can into the bin or carrycloth, replaces the container, and carries the solid wastes to the collection vehicle.

There are, of course, many modifications and adaptations of these methods to fit particular community needs, including the use of scooters, caddies, trains, etc. The five methods listed, however, are the basic systems now in wide use.

(See Table 6.2)

Route and crew organizations patterns must be integrated with the type and frequency of collection and with the amount of solid wastes to be collected. For example, provisions must be made to accommodate seasonal variations. The first pickup of the week is usually heavier than the second; thus the daily work load may vary considerably. Since neighborhood conditions differ greatly, routes must be planned and adjusted on an individual basis.

### 6.3 Collection Equipment

Any equipment or process which affords greater compaction probably brings long-range economy since more solid wastes can be handled conveniently at one time. Compaction vehicles are desirable for the above reason and because they can reduce the number of trips to the disposal site.





Table 6.2

## COMPARISON OF RESIDENTIAL COLLECTION SERVICES

Considerations	Curb Service	Alley Service	Set-Out Set-Back Service	Set-Out Service	Backyard Carry Service
Requires Homeowner cooperation:					
a) to carry empty cans	YES	OPTIONAL	NO	YES	NO
b) to carry full cans	YES	OPTIONAL	NO	NO	NO
Requires schedules service for homeowner cooperation	YES	NO	NO	YES	NO
Poor aesthetically:					
a) spillage and litter problem	HIGH	HIGH	LOW	HIGH	LOW
b) cans visible	YES	NO	NO	YES	NO
Attractive to scavengers	YES	HIGHEST	NO	NO	NO
Prone to upsets	YES	YES	NO	YES	NO
Average crew size required for efficiency*	1-3 MEN	1-3 MEN	3-7 MEN	1-5 MEN	3-5 MEN
Crew time*	LOW	LOW	GREAT	MEDIUM	MEDIUM
Collector injury rate due to lifting and carrying	LOW	LOW	HIGH	MEDIUM	HIGH
Trespassing complaints	LOW	LOW	HIGH	HIGH	HIGH



Table 6.2 (Cont.)

## COMPARISON OF RESIDENTIAL COLLECTION SERVICES

Considerations	Curb Service	Set-Out		Backyard Carry Service
		Alley Service	Set-Back Service	
Special considerations		Requires alleys and vehicles that can maneuver in them; less prone to block traffic; high vehicle and can depreciation rate.		Requires wheeled caddy to roll filled barrels or the use of bur-lap carry cloth or hand carry bin; works best with driveway.
Evaluation based on service to homeowners; cost due to crew size and time requirements.	Poor service, low cost	Fair service, low cost	Good service, high cost	Fair service, medium cost Good service, medium cost

\* Presumes use of standard compactor vehicle.

Source: "Guideline for Local Governments on Solid Waste Management", U.S. Environmental Protection Agency, 1971.



Enclosed compactor collection vehicles should be metal and watertight, and have low loading height, safety features, fast compaction cycle (to speed collection), and high compaction pressure. Officials should include initial price and estimated annual operating and maintenance costs in making comparisons of various vehicle designs and makes.

Some things to investigate before purchasing collection equipment are weight limits for all roads over which the vehicles will travel; vehicle stability (loaded and unloaded); turning radius; loading height; and vehicle height in the unloading position to ensure there is overhead clearance in transfer stations, service buildings, or incinerators.

Mechanically self-loading collection vehicles are frequently used with mobile detachable containers (bins) for non-residential collection. A bin is lifted automatically and emptied into the truck, which can be front side or rear loading, and may or may not provide compaction. The truck should be used with a crew of two: A driver and a helper to assist in rounding corners and backing safely.

Local governments should not permit open vehicles for general collection of solid wastes, but occasionally they can be used for bulky items if wastes are covered. Open trucks are inefficient solid waste collection vehicles. Such vehicles are usually of questionable safety, leak, and contribute to poor public opinion of the waste management program. Open trucks used to collect refuse are costly to operate due to no compaction and require more trips to the disposal site and possibly manual loading.





At present, the conventional rear-loading packer is believed to be the most effective refuse collection equipment currently available for packing refuse. The side-loading vehicle, however, is more efficient for use in one-man curbside collection operations, primarily because it locates the driver adjacent to both loading and container locations.

#### 6.4 Crew Size

In comparing the relative efficiency of refuse collection crews, the time to collect the refuse from each service stop is very important. Assuming that containers do not require two men for lifting and that collection equipment can be operated by one man, the incremental time at each service stop is the most important single factor determining relative efficiency of different size crews. During all time spent for travel, lunch, breaks, and at the disposal site, the relative efficiency varies inversely with the crew size.

#### 6.5 Public Cooperation

People should understand that a good refuse-collection service also requires citizen cooperation in the provision and use of proper receptacles in order to keep the community clean and essentially free of rats, flies, and other vermin.

#### 6.6 Study Area Collection

##### 6.6.1 Forsyth

The collection schedules and procedures currently used in Forsyth are adequate and should be maintained. As the community grows, it will be necessary to reevaluate the situation from time to time and make adjustments.



For the remainder of the study area, refuse should be stored in 1.8 cubic yard containers and should be collected twice weekly using the equipment presently owned by Forsyth. Bi-weekly pickup is necessary to control odor and vermin such as flies. As population increases, it may be necessary to increase the number of containers and/or step up the collection schedule.

#### 6.6.2 Collection Time Evaluation: (Present Analysis)

A. Rosebud:	1 hr.	2* weekly	2 hr.
B. Brewer:	1/2 hr.	2* weekly	1 hr.
C. Essex:	1/3 hr.	2* weekly	<u>2/3</u> hr.
			3 2/3 hr.

By proper scheduling of pickups, the additional time increase resulting from (satellite) collection can be absorbed in the present 40-hour work week now being used by the Forsyth crew. In the future when population growth reaches a maximum figure, a 48 hour week could be utilized.



## 7.0 ESTABLISHED REFUSE DISPOSAL METHODS

### 7.1 General

Because disposal technology is a key element in solid waste management, and no foreseeable technology can remove wastes from some combination of the air, water, and land resources, the public health implications of waste disposal require close scrutiny. Where health hazards are a factor, ways must be found to preclude contact between man and the hazardous components of the refuse.

The common acceptable refuse disposal and treatment methods are incineration, sanitary landfill, and, in some parts of the world, composting. Other methods of refuse disposal include the open dump, hog feeding, grinding and discharge to a sewer, salvage and reclamation.

### 7.2 Incineration

Incineration is a controlled combustion process of burning solid, liquid, or gaseous combustible waste to gases and a residue containing little or no combustible material (when properly carried out). It has a volume reduction process suitable for about 70% of the municipal solid wastes.

A properly designed and controlled incinerator is satisfactory for burning combustible refuse provided air pollution standards can be met. Continuous operation six or seven days a week and a high controlled temperature are needed for efficiency, prevention of excessive air pollution, and odor control.

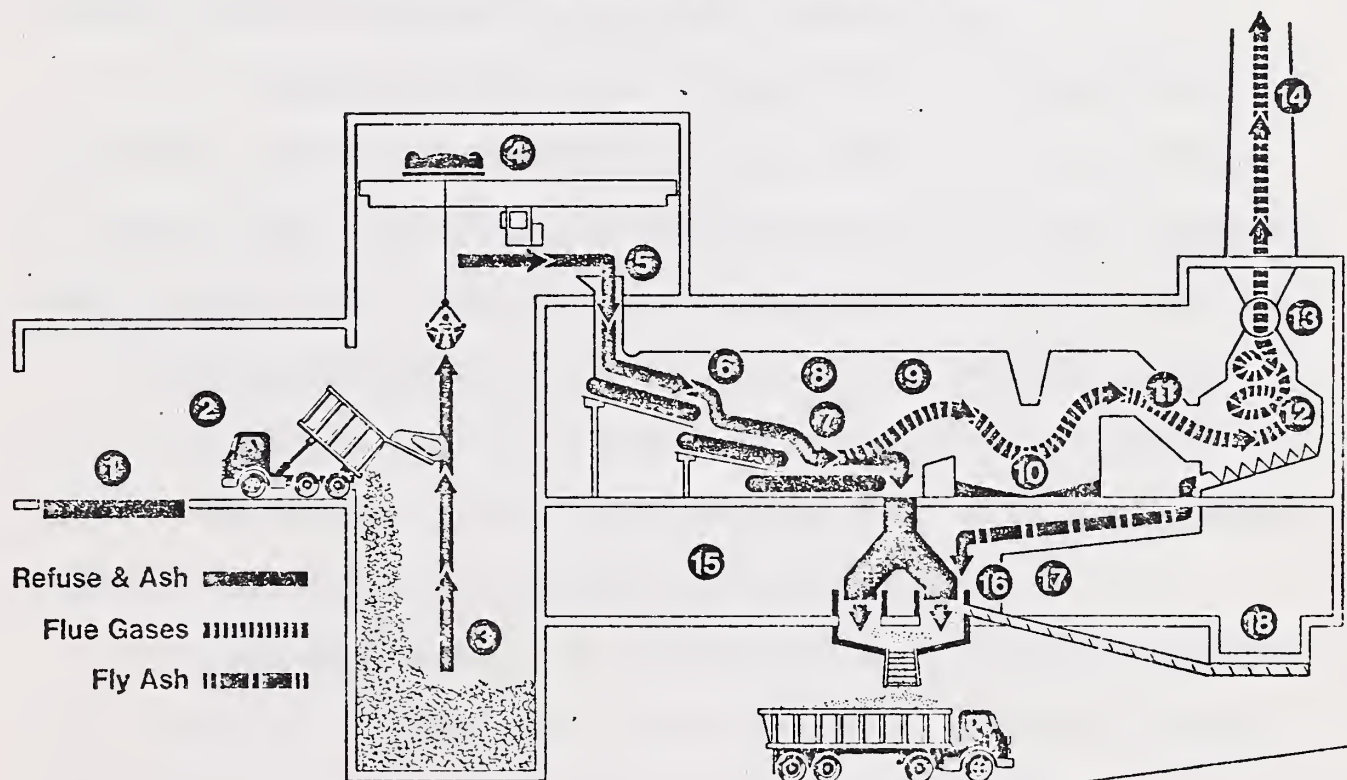




Refuse storage bins or pits providing at least 3 day's storage are necessary to provide sufficient refuse for a continuous period of operation. Incineration is not generally recommended for small towns. Past experience indicates that incinerators generally are not economically feasible for communities of less than 50,000 to 100,000 population. A basic incinerator design is shown in Figure 7.2.

FIGURE D:

## basic incinerator design



- |                      |                                 |                              |
|----------------------|---------------------------------|------------------------------|
| 1. Scales            | 7. Burning Grates               | 13. Induced Draft Fan        |
| 2. Tipping Floor     | 8. Primary Combustion Chamber   | 14. Stack                    |
| 3. Storage Bin (Pit) | 9. Secondary Combustion Chamber | 15. Garage - Storage         |
| 4. Bridge Crane      | 10. Spray Chamber               | 16. Ash Conveyors            |
| 5. Charging Hopper   | 11. Breeching                   | 17. Forced Draft Fan         |
| 6. Drying Grates     | 12. Cyclone Dust Collector      | 18. Fly Ash Settling Chamber |





### 7.3 Sanitary Landfill

Sanitary landfill is a controlled method of refuse disposal in which refuse is dumped in accordance with preconceived plan, compacted and covered during and at the end of each day. It is not an open dump. The nuisance conditions associated with an open dump such as smoke, odor, unsightliness, and insect and rodent problems are not present in a properly designed and operated sanitary landfill. A sanitary landfill is a well-organized, well-planned, and well-executed construction project to dispose of solid wastes without causing health hazards or nuisance conditions.

It is essential that the refuse site be planned as an engineering operation and that it be under close direction to assure that operation and maintenance follow the proposed plan and that the site does not deteriorate into an open dump.

The advantages of a properly operated landfill are:

(1) it is economical; (2) it requires a relatively small capital investment; (3) it may reclaim land that is otherwise useless; and (4) it causes no air pollution.

An important aspect of refuse disposal by this method is site selection. A site is often difficult to obtain unless officials can demonstrate that it will be operated in a sanitary manner. A program of public information is needed to insure that public understanding and acceptance of the plan are developed.

There are many methods of operating a sanitary landfill. The most common are the trench and area methods.



#### 7.4 Composting

Composting is the controlled decay of organic matter in a warm, moist environment by the action of bacteria, fungi, molds, and other organisms. This may be an aerobic and/or an anaerobic operation. Moisture is maintained at 40 to 65 percent; 50 to 60 percent is best. Composition of the refuse, disposal of refuse not composted, demand for compost and salvaged material, odor production and control, public acceptance, and total cost are factors to be carefully weighed. Compost is a good soil conditioner but a poor fertilizer. Compost characteristics are given in Table 7.4. The process is very attractive but because of the factors mentioned has not met with success in the United States.

The composting operation involves a combination of steps. These may include (1) weighing, (2) separation of noncompostables and salvage by hand and by a magnetic separator, (3) size reduction to 2 inches or less by means of a shredder, grinder, chipper, rasp mill, hammer mill, (4) ballistic and magnetic separation, (5) biological digestion by any one of a number of composting methods described below, (6) screening and possible standardization of fertilizer value, and (7) disposal by bagging for sale or transporting to a sanitary landfill.

This method would not be economical for the population densities considered in this report. Compost is not a fertilizer but is used only as a soil conditioner. Since it is not readily marketed, efforts at composting have failed many times in the United States. Compost is usually not



TABLE 7.4 COMPOSTING CHARACTERISTICS

Condition	Composting Time in Days					
	0	10	20	30	40	50
Temperature, Deg. F.	30 to 100	140 to 147	142 to 152	142 to 151	138 to 145	130 to 135
Carbon - % of dry weight	45	43	42	41	40	38
Nitrogen - % of dry weight	0.6	0.7	0.72	0.73	0.74	0.75
C/N - ratio %	80	62	58	57	56	55
pH*	5.8	6.3	8.3	8.3	8.3	8.3
Compost moisture - % of wer weight	50 to 55	48 to 53	47 to 52	46 to 50	44 to 47	41 to 43

Optimum composting period somewhat longer than seven weeks.

Source : extracted from O.W. Kochtitsky, W.K. Seman, and John S. Wiley, "Municipal Composting Research at Johnson City, Tennessee," Compost Science, 9, No. 4 (Winter 1969).

\* At 18-Inch depth, Windrow Composting.





purchased by farmers and local bag sales will dispose of only a fraction of the compost produced from a city plant.

### 7.5 Open Dump

The open dump is all too common and needs no explanation. It is never satisfactory, as usually maintained. Refuse is generally spread over a large area, provided a source of food and harborage for rats, flies, and other vermin. It is unsightly, an odor and smoke nuisance, a fire hazard, and often a cause of water pollution. It should be eliminated or its operation changed to a sanitary landfill.

Open dumping and burning is prohibited by state law as a means of disposal due to air pollution and other health factors.

### 7.6 Hog Feeding

Where garbage is fed to hogs, careful supervision is necessary. The spread of trichinosis to man, hog cholera, the virus of foot-and-mouth disease, and vesicular exanthema in swine is encouraged when uncooked garbage is fed to hogs. In some instances tuberculosis, swine erysipelas, and stomatitis may also be spread by raw garbage. The boiling of all garbage for 30 minutes will prevent transmission of trichinosis and economic loss to the swine industry due to hog illness and death.

For hog feeding to be satisfactory (in addition to the cooking of garbage) it is necessary to provide rat-proof concrete feeding platforms and structures; remove manure and leftover waste daily; dispose of leftover waste by sanitary landfill or incinerate or compost the waste; clean the hog pens and flush the feeding



platforms and troughs frequently. Wastewater should discharge to a disposal system that will not pollute receiving waters or become a nuisance. More often than not, these precautions are neglected. As a result fly and rat breeding is supported and bad odors are common.

### 7.7 Grinding

The grinding of garbage is fast becoming a common method of garbage disposal. It is highly recommended from a convenience and public health standpoint, but the disposal of other refuse remains to be handled. The garbage is promptly removed, thereby eliminating it as a source of odors and food for rats, flies, and other vermin. In one system, the home grinder is connected to the kitchen-sink drain. Garbage is shredded into small particles while being mixed with water and is discharged to the house sewer. In another system, garbage is collected as before, but dumped into large, centrally located garbage-grinding stations that discharge garbage to the municipal sewerage system. In small communities, the garbage-grinding station may be located at the sewage treatment plant. The strength of the sewage is increased and additional sludge digestion and drying facilities will be required when a large amount of garbage is handled.

Grinding will remove garbage, but not the remaining portions of solid waste which require disposal.

### 7.8 Salvage and Reclamation

The terms "salvage" and "reclamation" indicate several methods of disposal: Sorting of refuse either manually or mechanically for metals, tin cans, glass, paper, rags, and other materials that can be resold.



It is evident that under present economic and social conditions, that salvage and reclamation will not overcome the cost of segregating refuse on any scale. Decreasing prices for salvage materials and increasing labor costs make this method of disposal uneconomical and, like grinding, will remove only portions of the solid waste which requires disposal.

#### 7.9 Applicability of Various Methods to the Rosebud-Forsyth Study Area

The only satisfactory complete method of disposal of all types of refuse is the sanitary landfill method. All other types only reduce the volume of the refuse, leaving a certain portion for further disposal. In fact, in the United States the only methods which are widely used are open dumping, incineration, and sanitary landfill. The others have not gained acceptance primarily due to economic reasons. Thus, it seems reasonable to eliminate these methods as too expensive for use in the study area. Of the remaining methods, open dumping is prohibited by Montana law and incineration has proven too expensive for communities of less than 50,000 to 100,000 inhabitants. This is due to the large initial investment in equipment and facilities and the fact that economical operation requires continuous burning at least six days a week. A small community does not generate a sufficient amount of waste for this kind of operation. In addition, some provision must be made for the waste remaining after incineration. Thus, the only reason a small community would consider incineration as a waste disposal method would be absolute unavailability of land for a sanitary





landfill. Since this is not the case in the study area, it is the conclusion of the engineers that the sanitary landfill is the only means of solid waste disposal worthy of further consideration for Rosebud-Forsyth.





## 8.0 SANITARY LANDFILL

### 8.1 Disposal Method Selection

For a community the size of the study area, the sanitary landfill is the only method which is economically feasible. This might be a separate landfill or one which is used jointly by two or more communities. In either case, the same criteria apply to design and operation of the landfill.

In this study a number of methods of refuse disposal were examined. Incineration, composting, grinding and discharging into a sewer, salvage and recycling, open dump and sanitary landfill are some of the methods of refuse disposal that were analyzed. After an evaluation of the possible methods of disposal, it was determined that some form of a sanitary landfill would be the only economical method of refuse disposal.

There are a number of derivative methods of the sanitary landfill that are included in the scope of this study and are listed below.

1. Transfer method
  - 1.1 Transfer refuse to Colstrip
  - 1.2 Transfer refuse to Miles City
2. Local Sanitary landfill
  - 2.1 Local sanitary landfill - site 1
  - 2.2 Local sanitary landfill - site 2

### 8.2 Site Selection

An important engineering step toward establishing an acceptable sanitary land fill operation is site selection. As with the preliminary planning phase, proper site selection



can eliminate many future operational problems. The factors to be considered when selecting a sanitary landfill site will require technical know-how and experience, and so it bears repeating that a well-qualified individual or agency should be responsible for site selection.

#### 8.2.1 Land Requirement

The land area--or more important, the volume of space required--is primarily dependent upon the character and quantity of the solid wastes, the efficiency of compaction of the wastes, the depth of the fill, and the desired life of the landfill. Data on the quantity and character of residential, commercial, and industrial solid wastes to be landfilled are therefore necessary for estimating the space required. In estimating volume requirements, volume reduction of the solid wastes due to compaction must be considered. The desired life of the landfill is another major factor in determining the total volume required.

The volume requirement for a sanitary landfill should be determined on the basis of the specific data and information for each individual project. As an estimate, however, using a waste generation rate of 5.3 pounds per person per day, solid waste density of 1,000 pounds per cubic yard, and one part earth cover to four parts waste, a population of 10,000 people would require 15 acre-feet of space per year.



### 8.2.2 Zoning Restrictions

A survey conducted by the American Public Works Association in 1956 indicated that a high percentage of cities are restricted by their zoning ordinances in the acquisition of disposal sites. Consequently, before a full-scale investigation of a potential site is undertaken, all zoning ordinances should be reviewed and cleared or changed to eliminate any legalities that could prevent or indefinitely hold up the use of a particular parcel of land for a sanitary landfill. Advance planning to zone the potential landfill site areas for sanitary landfill operation can circumvent many of these problems.

### 8.2.3 Accessibility

The site should be easily reached by trucks via highways or arterial streets. Sites requiring trucks to travel through residential areas will normally draw many complaints. Such sites should be avoided or selected to minimize residential travel.

The roads to the site should be of width and construction adequate to handle all sizes of trucks when fully loaded, during all weather conditions. Such problems as narrow bridges, low underpasses, and steep grades on the access routes should be investigated. Since the site should be accessible at all times, it is desirable to have several access routes so that if one route is temporarily closed another route can be used.





#### 8.2.4 Haul Distance

The haul distance is an important economic factor in selecting the sanitary landfill site. The economic distance to the site will vary from locality to locality depending upon capacity of collection vehicles, hauling time, and size and methods of the collection agency. The larger the quantity of refuse hauled per trip and the shorter the hauling time due to express roads, freeways, etc., the greater the distance the solid wastes can be hauled for the same cost.

#### 8.2.5 Cover Material

The availability of cover material is another economic factor to consider, for the cost of hauling cover material to the site can be excessive. A site that has cover material close by will keep these costs at a minimum.

The field investigation of the potential site should include soil analysis to determine the suitability and the quantity of soil available for cover material. Soil with good workability and compaction characteristics is the most desirable cover material. A well graded soil has these qualities and is a good cover material.

#### 8.2.6 Geology

The potential danger of ground and surface water pollution resulting from the landfill cannot be overlooked. Solid wastes ordinarily contain many contaminants and often infectious materials. Serious health hazards or nuisances can result if these pollutants are permitted to enter water supplies. Site selection should include a geological investigation of the site, possibly in conjunction with the cover material



field investigation, to determine the potential for either ground or surface water pollution. The groundwater table must be located and information obtained on the historical high groundwater level and on the general movement of the groundwater.

Geological investigation should also examine the topography of the site itself and the surrounding area to determine potential flooding conditions during heavy rains and snow melts. Special attention should be given to low-lying sites that might be drainage basins for surrounding areas. Surface water drainage and flooding can quickly erode the cover material and the refuse fill.

Sites located near rivers, streams or lakes also deserve careful scrutiny. Generally, a landfill should not be located in a flood plain because of the water pollution hazard, and because these sites can become unusable both during and after floods. Sanitary landfills that are located in such areas require special engineering design compatible with the site conditions.

#### 8.2.7 Climate

In some locations, climate is important in site selection and may even dictate the method of operation. In an extremely cold locality, a site requiring excavation of trenches and cover material may pose a problem because of freezing during the winter months. However, a site can be used in a wintry locale if enough trenches and cover material are excavated during the summer months to carry the operation through the winter period.



In areas receiving considerable rainfall, a low-lying site may be undesirable because of flooding and muddy working conditions. In rainy areas, a desirable site would be high in relation to the surrounding area and have good drainage features.

In windy locales, a site surrounded by natural wind-breaks will help to contain loose paper and minimize any dust problems.

#### 8.2.8 Fire Control Facilities

Although there is little chance of fire at a sanitary landfill operated in accordance with good practices, suitable fire protection should be provided. Fires can usually be extinguished by smothering with a blanket of earth, but all sites should also have water available for fire control. Fire control facilities are especially important if residential or commercial structures are relatively close and in extremely dry areas where the fire could spread quickly and do extensive damage.

#### 8.3 Operating a Sanitary Landfill

The appearance of the sanitary landfill during operation cannot be overly stressed. The operation is the only phase of the project seen by the public. Consequently, public acceptance of the plan, design, and operation will be based solely on the operation.

A well-operated sanitary landfill is the goal of the planner, the designer, and the operator. Each must have a thorough knowledge of all the factors in achieving this goal.





The landfill should be open only when an operator is on duty. If it is anticipated that waste will be brought to the disposal site at other times, a large container should be placed outside the site entrance.

An operation's plan should be defined and is essentially the specification for construction and should contain all items required to construct the sanitary landfill. It should describe: (1) hours of operation; (2) traffic flow and unloading procedures; (3) measuring procedures; (4) placement of cover material; (5) maintenance procedures; (6) adverse weather operations; (7) fire control; (8) litter control; and (9) salvage operations, if permitted. This plan must be open for revision when necessary.

#### 8.3.1 Wet Weather Operation

Wet weather can seriously hamper the operations of a sanitary landfill by making the soil too soft, mucky, or slippery for equipment operation. Wet weather can also seriously interfere with trenching, covering, and general traffic flow to and from the working face. For these reasons, all-weather access roads and adequate drainage should be provided.

In many cases it is advantageous to stockpile materials such as concrete rubble, broken asphalt pavement, or stone for use on the site roads during wet weather. This will minimize the cost of constructing and maintaining hard-surface roads to the unloading area. It is also desirable to provide a temporary wet weather landfill area adjacent to the all-weather road. Such sites are used only during the wet weather periods when the normal working area is not accessible.





### 8.3.2 Winter Operations

Experience has shown that with good planning and proper operating techniques, a sanitary landfill can be operated even in the severe winters of the northern states. If the trench method is used, the trenches should be excavated before the cold weather. It may be necessary to stockpile cover material and cover it with straw, leaves, or other material to prevent freezing. The material should be piled loosely with minimum compaction. All snow and ice should be removed from the trenches before use; snow fences can protect the access roads. A well-constructed, heated tractor cab enables the operator to work efficiently during the cold weather.

## 8.4 Design Considerations

### 8.4.1 Drainage

Ponding on the landfill surface will result in excessive seepage into the landfill and must be prevented. Precautions must be taken to prevent runoff water from eroding the cover material and exposing the wastes. Adequate drainage therefore is essential both during the filling operation and for the completed landfill. Good drainage will usually require periodic regrading of the site, and the use of culverts or grassed waterways. It is recommended that the slope of the surface of the completed fill should be a minimum of 1 percent. Since the landfill will undergo uneven settlement, it may be necessary to design the original slope for more than 1 percent to maintain a 1 percent slope after settlement. To prevent erosion, however, steep slopes should be avoided.



#### 8.4.2 Signage and Controls

Sanitary land fills need directional signs to help traffic movement. At the entrance to the site a large legible sign should be posted to inform the public of hours of operation, cost of disposal, and rules and regulations.

In a 1959 survey of sanitary landfill operations by the American Society of Civil Engineers, the operating problem most frequently reported was blowing paper. The common method of controlling blowing paper is with a combination of permanent and portable fences. It is important, therefore, that the designer consider the prevailing wind direction when designing the operation. Unfortunately, under certain wind conditions paper may blow up and over the fences, so that fences do not provide complete control. Prompt compaction and covering and daily pick up of loose paper should be practiced to control wind-blown paper.

Routine maintenance will be required to maintain a clean, orderly and acceptable operation and site. It is important, particularly at public sanitary landfills, to cut grass and weeds, pick up scattered paper, maintain good access roads, control dust, and maintain immaculate employee and public facilities.

#### 8.4.3 Cover

The compacted solid wastes must be covered at the conclusion of each day, or more frequently if necessary, with a minimum of 6 inches of compacted earth. A well-graded soil having good workability and compaction characteristics is a most



desirable cover material. If a well-graded soil is not available on the site, it will be necessary to adjust the covering procedures to the type of cover material available or to haul in a suitable cover material. The cover is necessary to prevent insect and rodent infestation, blowing paper, fires, the attraction of wildlife, and the release of gas and odors.

For daily cover a minimum of 6 inches of compacted soil is recommended. For intermediate cover on lifts which will not have additional lifts placed on them within a year, a minimum of 12 inches of compacted soil is recommended. A minimum of 2 feet of compacted soil is recommended for the final cover. The final cover should be placed over the fill as soon as possible to help assure that wind and water erosion does not expose the wastes. Where trees will be planted on the completed fill, a depth of 3 or more feet of compacted earth has been found necessary.

#### 8.4.4 Compaction

Solid wastes should be placed at the top or base of the working face, spread in layers about 2 feet thick, and compacted. If a slope or ramp is used, better compaction will normally result if the wastes are spread and compacted from the base upwards.

The degree of compaction is dependent on the character of the solid wastes, the weight and type of compacting equipment, and the number of passes the equipment makes over the material. The actual density of the landfill can be determined from operating records and data. The degree of compaction is a useful tool to determine the rate of space usage, expected life of the landfill, and the overall efficiency of the operation.





#### 8.4.5 Large Items

Large bulky items such as car bodies, refrigerators, water heaters, and tree stumps, can be handled routinely with other solid wastes at large sanitary landfills that use heavy equipment. At small sanitary landfills where light equipment is normally used, special provisions may be necessary to handle bulky items.

A separate unloading area or an alternate site operated in a sanitary manner should be utilized for the disposal of bulky items that cannot be handled routinely with other solid wastes.

### 8.5 Supervision

The appearance of the sanitary landfill during operation cannot be overly stressed. The operation is the only phase of the project seen by the public. Consequently, public acceptance of the plan, design, and operation will be based solely on the operation. A clean, orderly, and economic operation requires constant and competent supervision. It is also important to employ experienced or adequately trained personnel to operate the sanitary landfill.

#### 8.5.1 Operating Records

For continuing evaluation and future planning, detailed records should be kept of incoming material: the weights, the type, and the origin. Any deviation from the plan of operation should be recorded. Topographic surveys of the landfill should be made regularly to determine the rate of



space utilization. The incoming material data and the topographic surveys can be used to determine the amount of compaction, efficiency, land use, and operation efficiency, and to estimate the degree of decomposition and eventual settlement. Good cost-accounting records should be maintained.

#### 8.5.2 Record Uses

Detailed records of a sanitary landfill operation should be kept to facilitate future operation of the fill and for comparison with other operations. In preparing records, it is important to note the type of material, the volume or weight, and the origin of the refuse. The origin becomes important when considering the amount of refuse generated per capita. This information is required to calculate the area of land required for a sanitary landfill. The records should include an accurate measurement of the amount of material delivered for burial. Unit measurement can be made by either weight or by volume. The former is the most accurate and is the most desirable especially when various sized trucks are using the fill. This can be accomplished readily if scales are available for weighing each load. A comparison should be made periodically, if this method is used, with the unit weight. If scales are not available, then an estimated volume basis can be used. The estimating method is subject to error because of the compaction the material has received on arrival as well as the human error of an estimate.

The volume of any fill may be determined by comparing before-and-after topography including consideration of the volume of cover used. This is important in estimating the



area of land necessary for a future operation. Comparing the gross volume before burial with the cell volumes will also indicate the degree of compaction. This information together with an analysis of the buried material will give an indication of the degree of anticipated decomposition and eventual settlement. To gain actual and accurate information on the degree of settlement and decomposition, it is necessary to record location and completion dates of various trenches or areas. A cost-accounting system including cost of equipment, land, and labor is necessary for budgetary purposes and for efficiency comparisons with other operations. //

#### 8.5.3 County Operations

A sanitary landfill operation administered by the county would have advantages over a municipal operation. A county operation could serve a number of incorporated and unincorporated areas using existing government apparatus, and would allow comprehensive planning for a larger geographic area. Other advantages are economy of scale and possibility of a greater availability of land.

#### 8.5.4 Public Relations

Good public relations can pay direct dividends in reduced operating cost by allowing a close-in operation. All personnel should understand the methods used in this type of disposal. A well-informed and courteous employee can do much to help educate the public. The public should be informed as to the function, methods, and achievements of the sanitary landfill and invited to visit the site. Newspapers and other forms of advertising media can be used as well as signs. The hours of





operation should be posted and published, and directional arrows or markers should be used to indicate the location at which refuse is to be deposited. This is especially important if the fill is open for public use.

A good landfill operation is often spoiled by inadequate attention to blowing paper and spilled refuse on the access road as has happened in the case of the existing landfill used by Forsyth. Complaints should have quick and effective attention if this method is to receive acceptance by the public. The operation should be so maintained that the public is welcome at any time. //

Constant supervision should be provided at the fill site to manage unloading procedures and to assure a clean and orderly operation.

## 8.6 Public Health Aspects

### 8.6.1 Vector Control

In a properly operated and maintained sanitary landfill, insects and rodents are not a problem. Well-compacted wastes and cover material are the most important factors in achieving vector control. Six inches of compacted earth cover is recommended for preventing the emergence of houseflies from the fill. Good compaction of the cover material also discourages rodents from burrowing through the cover material. Good housekeeping and daily covering of the solid wastes are musts for vector control.

### 8.6.2 Water Pollution

Under certain geological conditions, the burial of solid wastes provides real potential for chemical and bacteriological





pollution of ground and surface waters. Several investigations of the pollution of groundwater from landfills have indicated that if the groundwater is intermittently or continuously in contact with a landfill, it can become grossly polluted and unfit for domestic or irrigational use.

Proper planning and site selection, combined with good engineering design and operation of the sanitary landfill, can normally eliminate the possibility of either surface or groundwater pollution. Some common preventive measures are: (1) locating the site at a safe distance from streams, lakes, wells, and other water sources; (2) avoiding site location above the kind of subsurface stratification that will lead the leachate from the landfill to water sources, i.e., fractured limestone; (3) using an earth cover that is nearly impervious; (4) providing suitable drainage trenches to carry the surface water away from the site.

#### 8.6.3 Air Pollution

Air pollution caused by smoke should not occur. Burning is not permitted at a properly operated sanitary landfill. If an accidental fire does occur, it should be extinguished immediately.

#### 8.6.4 Dust

In dry weather, dust may constitute a nuisance at a sanitary landfill operation. Dust at the unloading area can be controlled by sprinkling the unloading area and the deposited refuse with water. Other dust control measures are the planting of grass or other vegetation on the finished fill and the application of water, road oil, or calcium chloride to the access roads.



#### 8.6.5 Wildlife

Birds and other wildlife are common at open and burning dumps. There is little exposed food to attract wildlife at sanitary landfills, and most good sanitary landfill operations are free from these nuisances. However, there is no guarantee that all sanitary landfills will be completely free of wildlife.

If the site is kept clean and the solid wastes covered promptly with earth, gulls and other wildlife will be at a minimum.

#### 8.6.6 Gas Production

Gases produced within a sanitary landfill consist chiefly of methane, nitrogen, carbon dioxide, hydrogen, and hydrogen sulfide. Methane gas is explosive and can be a hazard if accumulated in enclosed spaces. At landfills where methane and other gasses are generated, the gases should be dissipated into the atmosphere and prevented from concentrating in sewers or other structures located on or near the site.

#### 8.6.7 Hazardous Materials

Although it is not common or recommended practice, hazardous materials such as sewage solids, radioactive wastes, pathologic wastes, explosive materials, and chemicals can be disposed of at sanitary landfill sites under special conditions. The special provisions for handling and disposing of these materials will depend on local conditions. Individual handling and disposal may be necessary using a special area separate from the main operation. The particular requirements should be considered during the design phase so that they may be included in the operational specifications.



## 8.7 Sanitary Landfill Methods

There are two basic landfill methods, trench and area; other approaches are only modifications. In general, the trench method is used when the groundwater is low and the soil is more than six feet deep. It is best employed on flat or gently rolling land. The area method can be followed on most topographies and is often used if large quantities of solid waste must be disposed of. At many sites, a combination of the two methods is used.

### 8.7.1 Trench Method

Waste is spread and compacted in an excavated trench. Cover material, which is taken from the spoil of the excavation, is spread and compacted over the waste to form the basic cell structure (Figure 11.2.4 ). In this method, cover material is readily available as a result of the excavation. Spoil material not needed for daily cover may be stockpiled and later used as a cover for an area fill operation on top of the completed trench fill. This method has the advantage of providing a more direct dumping control than is generally possible with the area method since a definite place is designated for dumping. Thus, scattering of refuse by wind is minimized and trucks can be more readily directed to the trench.

### 8.7.2 Area Method

In this method, the waste is spread and compacted on the natural surface of the ground, and cover material is spread and compacted over it (Figure 11.2.5). It is generally





necessary to strip and stockpile sufficient cover material to meet the total need for earth cover; if this is not possible, earth must be hauled in. The area method is used on flat or gently sloping land and also in quarries, strip mines, ravines, valleys, or other land depressions.

#### 8.7.3 Combination Methods

A sanitary landfill does not need to be operated by using only the area or trench method. Combinations of the two are possible, and flexibility is, therefore, one of the sanitary landfill's greatest assets. The methods used can be varied according to the constraints of a particular site.

#### 8.8 Advantages and Disadvantages of Sanitary Landfills

The advantages of a well-planned and operated sanitary landfill are 1) it is economical; 2) it requires a relatively small capital investment; 3) it may reclaim land that is otherwise useless; and 4) it causes no air pollution.

There are also disadvantages: 1) it frequently requires long and costly hauling; 2) it requires a fairly large amount of land; and 3) operational problems may occur during inclement weather.

It is often difficult to obtain a site for a landfill until officials can demonstrate that it can be operated in a sanitary manner. Because of past inadequate operations, public resistance often dictates that a site be located a long distance from any populated area. Inadequate cover material may permit flies to emerge from eggs or larvae in the raw refuse. Even though the refuse is covered daily,



it may be necessary to institute some fly control measures around a sanitary landfill.

In the final analysis, the most important thing about the sanitary landfill for purposes of this study, is the fact that, in some form, it is the only satisfactory method of waste disposal which is economically feasible for a small rural community.



## 9.0 TRANSFER STATION

### 9.1 Selected Method

Transferring the refuse to Colstrip is the recommended method of refuse disposal proposed for the Rosebud-Forsyth communities. This method was selected because of the low cost of refuse disposal that it offered.

#### 9.2.0 Transfer Method

A transfer station will not lower the door to door collection cost. Disposal cost/ton can be lowered when refuse quantities are increased. Savings is also realized by reducing the haul distance from collection zone to the unloading zone. This benefit is utilized when the collection truck only travels a short distance to the transfer truck. In this way the collection truck and crew can return to collection route or conclude the work day.

Two sites will be examined in the transfer station method.

- |                          |          |
|--------------------------|----------|
| 1. Forsyth to Miles City | 46 miles |
| 2. Forsyth to Colstrip   | 35 miles |

Refuse must be transferred to landfill at least two times a week. This is necessary to control unpleasant odors.

A storage area for transfer trucks must be obtained. This storage area should be an adequate distance from public areas to isolate the truck odors from the public. This area should also be relatively close to the collection area to eliminate excessive haul distances. The gross vehicle weight of the transfer trailer and tractor must be considered



in the scheduling of disposal. The present daily solid waste generation of 9,450 pounds has been estimated for the study area. This would produce 14.2 tons of solid waste at a maximum every three days. The axle loads and GVW are well within Montana's requirements. The final scheduling can be determined by actual results. Presently two loads per week should be sufficient.

After talking to people from Western Energy, it was determined that Colstrip is not overjoyed with the idea of accepting Forsyth's solid waste, although it was said that Colstrip would consider accepting Forsyth's solid waste if it was significantly more economical for Forsyth than other disposal methods. If the use of Colstrip's sanitary landfill is chosen by Forsyth, further study will be necessary by Colstrip.

Presently, Colstrip has an excellent sanitary landfill and it has been accepted by the Montana Health Board. Operational aid is given by Bechtel Construction.

#### 9.2.1 Transfer Method Description

The transfer method is a means of reducing disposal costs by utilizing equipment and facilities of one common landfill site. The operational costs of the landfill can in this way be shared by more than one community. Cost/ton for refuse disposal is reduced as the number of users increases.





### 9.2.2 Transfer Station Costs

Estimated operating costs of transfer trailer and tractor are shown below.

	\$1.00/mile
Fuel	.12
Oil	.02
Tires	.07
Maintenance	.04
Insurance & Licenses	.02
	<u>.27</u>

Costs can vary substantially dependent on haul time, mileage, and tractor design. These operational costs are applied if tractor and trailer are owned. Cost of a new tractor would range from \$16,000 to \$30,000. Buying the trailer and hiring a driver with a truck to haul the trailer twice weekly would be more economical than purchasing both the trailer and tractor. a typical cost/mile for a tractor is \$1, including the driver's wages. This charge may vary depending on the availability of equipment.

Below are the costs experienced in renting a tractor.

\$1 - cost/mile (one way charge)  
35 - distance in miles  
2 - number of times weekly is rate

$$\text{\$1} \times 35 \times 2 \times 2^* \times 52 = \text{\$7,280/year}$$

\* Note: The factor of 2 is used assuming the tractor is rented from Colstrip. If a tractor is available in Forsyth the cost will be cut in half.



## 10.0 CHOOSING AMONG ALTERNATIVES

For the Rosebud-Forsyth study area, the only economical method of solid waste disposal is the sanitary landfill. This may be locally operated or it may be located some distance away, in which case transfer of refuse would be necessary. Community leaders must choose between these alternatives and once this choice is made, they must choose a site either for the landfill or for transfer.

What criteria should be used in making these choices? The overriding consideration is cost. Factors mentioned in the previous chapter are all important, but by careful analysis even the intangibles can be roughly measured in the cost.

### 10.1 General

In order to make an analysis of comparative costs, it is important first to set down all of the factors included in the total costs of operation. When such cost data are then compared with other cost data, it is necessary that the same factors shall have been considered. However, it is actually very difficult to assemble all of the factors pertinent in making comparisons of costs between various methods of refuse disposal. It is the purpose of this section to draw attention to the cost factors involved. The most obvious factors are listed below:

- a. Salary and wage rates.
- b. Equipment charges - including depreciation, maintenance, and repair.
- c. Cost or rental of land.
- d. Physical conditions caused by different soil types, in the case of a sanitary landfill.
- e. Amortization of any bonds which may have been issued to initiate the project.



It should be noted that in choosing among alternatives for the Rosebud-Forsyth area, collection costs can be ignored as they will be the same in any case. What is important is a comparison of investment and operating costs.

## 10.2 Sanitary Landfill Costs

### 10.2.1 General

The cost of a sanitary landfill consists of initial investment for land, equipment and construction and the operating costs. The magnitude of the initial investment depends on the size and sophistication of the landfill. A typical breakdown of the major items that normally constitute the initial investment is as follows:

1. Land
2. Planning and design
  - a. Consultant
  - b. Solid wastes survey
  - c. Site investigation
  - d. Design, plan, specifications
3. Site development
  - a. Land development--clearing, landscaping, drainage features, etc.
  - b. Access roads
  - c. Utilities--water, electricity, telephone
  - d. Fencing, signs
4. Facilities
  - a. Administration
  - b. Equipment maintenance
  - c. Sanitation
  - d. Weight scales
5. Equipment--tractor, scraper, etc.

Generally, the major portion of the initial investment is for the purchase of the land and equipment. If funds are not available for the proposed investment, consideration should be given to leasing land or equipment, or both, to spread the cost over the life of the operation.





The operating cost of a sanitary landfill depends on the cost of labor and equipment, the method of operation, and the efficiency of the operation. Following are the principal items in operating cost:

1. Personnel
2. Equipment
  - a. Operating expenses--gas, oil, etc.
  - b. Maintenance and repair
  - c. Rental, depreciation, or amortization
3. Cover material--material and haul costs
4. Administration and overhead
5. Miscellaneous tools, utilities, insurance, maintenance to roads, fences, facilities, drainage features, etc.

Wages ordinarily make up about 40 to 50 percent of the total operating cost. Equipment equals 30 to 40 percent; cover material, administration, overhead and miscellaneous amount to about 20 percent.

#### 10.2.2 Site Selection for Sanitary Landfill

The choice of site will greatly influence the method of operation, be it area or trench. In the case of a site where either may be employed, a comparison of these costs is also necessary.

The total cost of operating a sanitary landfill will depend to a large extent, on the type of terrain in which the operation must be conducted. Generally, if the area is open, reasonably level, and the soil a sandy loam, the operation cost can be expected to be quite moderate. If operations must be conducted in an area where material-handling operations are considerably more difficult, the costs will be higher. The type of equipment required to operate efficiently in the location selected will have a considerable effect on costs.



If open land is not available and it is necessary to work in ravines or gullies, engineering study is required to devise the most economical operation, as the obtaining and placing of the cover material will be more expensive.

#### 10.2.3 Cost of Haul to the Disposal Site

It is probably important to determine the point where the collection routes end and the haul to the disposal site begins for purposes of making comparative cost analyses between sites. However, comparison of the length of haul or of ton-miles will not give a complete answer. Here again, there are several factors that must be considered in order to arrive at a true cost. In many communities it is the custom to allow the crew of the refuse collection trucks to ride to the sanitary fill, while in other instances all members of the crew except the driver switch over to another collection truck at the time the filled truck starts the run to the disposal site. Other communities have a shuttle driver who drives the filled truck to the site by himself, leaving an empty truck for the crew to continue its collection work. In some instances, it may be necessary for the driver and a helper to go to the disposal site in order to discharge their equipment properly and completely. All of these variations will, of course, result in a variation in the cost of the haul to the disposal site.

Traffic problems on the highways will be a factor in computing the cost of the haul to the disposal site and of course, the type and condition of the highways or roads



over which the haul must be made will affect the ton-mile costs. Climatic conditions can be an important factor here, particularly if snow or rain make it difficult to use the roads and highways at certain times of the year.

Maintenance of the roads within the area of the site and off the main roads is a cost that must be included somewhere. Frequently such costs are included with the costs of operation of the fill itself, as this work may be accomplished by the equipment working at the fill. Sometimes, however, this work is accomplished by the assignment of a road grader from the street department and such costs, if appreciable, should be included.

#### 10.2.4 Operating Equipment Costs

Selection of proper equipment to suit the particular job is of real importance. Equipment costs per hour will be higher if the equipment is too large, too small, or otherwise unsuitable for the job it has to do. (See Figure 10.2.4.)

The original purchase of equipment frequently causes financial problems in small communities. An equipment rental and depreciation that is adequate must be decided upon. In establishing equipment rental charges consideration must be given to the number of hours per year that the equipment will be operated. In general, the depreciation cost per hour will be less if the equipment is used fairly constantly throughout the year than if it is used only part of the time.





## Estimating Machine Sizes Needed

Population Served	Daily Tonnage Produced	Track-Type Tractors	Track-Type Loaders	Wheel-Type** Loaders	Landfill*** Compactors
Up to 15,000	Up to 35	D4D	941B	920-930	
10,000-35,000	25-90	D5	951C	950	
25,000-80,000	60-200	D6C	955L	966C	
					816
70,000-110,000	175-275	D7F	977L		
100,000-200,000	250-500	D8H	983		
200,000 & Up	500 & Up	Variety of Machine Combinations			826B

*\*\*Equipped with landfill tires or V-cleat steel wheels.*

*\*\*\*Cat landfill compactors work well with existing equipment. Or when no excavation is required and cover material is stockpiled nearby they can work alone.*

Figure 10.2.4

### 10.2.5 Overhead Costs

Overhead and administrative costs may not be the same for all alternatives considered for refuse disposal.

In the case of overhead costs one must arrive at some practical decisions, for limits must be drawn somewhere as to the items that will be included in the costs of overhead. It is probable that some percentage of the cost of administration would be included. In the cost analysis sections of this study, the only overhead and administrative costs that will be considered are those which may be greater for certain methods of collection or disposal than for others.

### 10.3 Transfer Station Costs

#### 10.3.1 General

The costs of a transfer station include initial investment, operating costs and disposal costs. The initial





investment will be for the transfer station and will normally include the following costs:

1. Land
2. Planning and design
3. Construction
4. Facilities
  - a. Equipment maintenance
  - b. Administration
5. Equipment--storage trailer with or without compactor, and possibly, a hauling truck

If hauling is contracted to a private party, purchase of lease of a hauling truck will not be necessary.

The principal items of operating costs are as follows:

1. Personnel
2. Equipment
  - a. Operating expenses--gas, oil, etc.
  - b. Maintenance and repair
  - c. Rental, depreciation, or amortization
3. Miscellaneous tools, utilities, insurance etc.
4. Administration and overhead
5. Hauling charge if contracted to private concern

In addition, there is a disposal cost, normally a per ton flat fee charged by the sanitary landfill accepting the refuse. In fact, one of the big advantages of this disposal method is that it generally lowers the per unit cost of disposal by allowing small operations to operate on a larger scale, thereby using personnel and equipment more intensively.

#### 10.3.2 Selection of a Disposal Site

The first step in selection of a disposal site is finding a landfill which will accept the refuse. Once this is accomplished,



alternative sites should be compared on the basis of cost. There are two costs to consider: haul cost and disposal cost. The haul cost in this case is the cost of moving the storage trailer from the transfer station to the disposal site. This will be influenced both by distance and road conditions. In some cases, there is a cost involved in hauling from the end of the collection route to the transfer station. If this cost is substantial, it too, must be included.

In addition, consideration should be given to the question of whether hauling is to be done by a governmental agency or by a private firm. Relative costs can be determined on a bid basis.



## 11.0 DESCRIPTION & COST EVALUATION OF ALTERNATES

### 11.1 Volumes of Refuse Generated Within the Study Area

To determine the land requirements needed for the sanitary landfill site volumes of refuse generated must be calculated. Eight thousand seven hundred and sixty cubic yards of refuse were generated by the future 20-year average overall population in the study area per year before tractor compaction was made. This volume will be decreased to 6,022 cubic yards per year after the refuse is placed and the tractor compaction completed. This volume will be increased after dirt cover is added. Generally speaking, the volume of refuse to cover material is 4:1. Total acreage needed for a 20-year period will be 18 acres for a trench type and 16 acres for an area type sanitary landfill site. A dirt cover of 6 inches will be placed over refuse at the end of the day. Upon completion of the filling operation, a final compacted cover of two feet of a suitable earth material or at least three feet for tree planting shall be placed within one week after the final deposit of refuse is placed.

### 11.2 Alternative (Sanitary Landfill)

#### 11.2.1 Site 1 Evaluation

Site 1 is located in Section 36 of Township 7N, Range 39E. This site is easily accessible in most kinds of weather to all vehicles expected to use it. The site location is 9 miles from Forsyth, near Windmill and is presently being leased by Big Timber Livestock Company. Most of the nine





miles of road consists of good roads where snow removal would be no problem. One and three quarters miles of the access road will require construction and gravel surfacing. Cost of road construction including gravel surfacing will total approximately \$33,000 at a cost of \$3.50 per linear foot.

The land contour is relatively gentle and suitable for landfill operations. The geology of the area is favorable. (See soils map for description.) Soil for Site #1 consists primarily of well-drained sandstone and shale. These soils are shallow to moderately deep. The contour of the land ranges from level to steep. It will be necessary to determine the water table at this site. Surface waters should be diverted to restrict the erosion process of cover material.

#### 11.2.2 Site 2 Evaluation

Site 2 is located at Section 36 of Township 6N, Range 41E. The site is 10 miles from the city of Forsyth. Nearly three-fourths of the road is highway. The remainder of the access road is dirt and will require snow removal during winter months. This should be no large problem, and if snow removal requirements are not excessively large, site equipment could be used. To accomplish this job, road improvements to include gravel surfacing will cost \$3.50 per linear foot, totaling \$42,000.

The soils and ground contour is suitable for landfill operations. (See soils map for description.) Soil for Site #2 consists primarily of well-drained soils of the high terraces. Also the northwest corner of the site consists of



well-drained soils of sandstone and shale uplands. The contour of the ground ranges from nearly level to steep. Figure 2.5 shows the classifications and describes the contour of the study area. The water table should be determined in this area. Surface water should be diverted to restrict erosion process of cover material.

### 11.2.3 Sanitary Landfill General Effects

During the operation of the proposed sanitary landfill, a number of changes will result. In using either Site 1 or Site 2 the driving distance to these sites will increase very little in relation to the present site and would generate little extra cost. Refuse containers would also have to be purchased. Each 1.8 cubic yard container costs \$300. Present collection equipment will be adequate for the proposed landfill.

There are many methods of operating a sanitary landfill. The most common are the trench and area methods.

The trench method (See Figure 11.2.4) has the advantage of providing a more direct dumping control, which is not always possible with the area method. (See Figure 11.2.5) Since a definite place is designated for dumping, scattering of refuse by wind is minimized and trucks can be more readily directed to the trench. The area method is more suitable for level ground. Here it is necessary to strip and stock pile sufficient cover material to meet the total need for earth cover; if this is not possible, earth must be hauled in.



#### 11.2.4 Trench Method Description

The trench method sanitary landfill will consist of 18 acres. The site will be fenced to prevent animals from roaming at large over the site. The fence will also regulate the dumping and eliminate dumping at unauthorized times.

The trench method will be seven to eight feet deep and approximately 20 feet in width. The compacted refuse will be five feet in depth and a two foot cover will be placed and compacted over the disposal trench. The cover material will be obtained from previous trench excavation.

When the trench method is used, the trenches should be excavated before the cold weather.

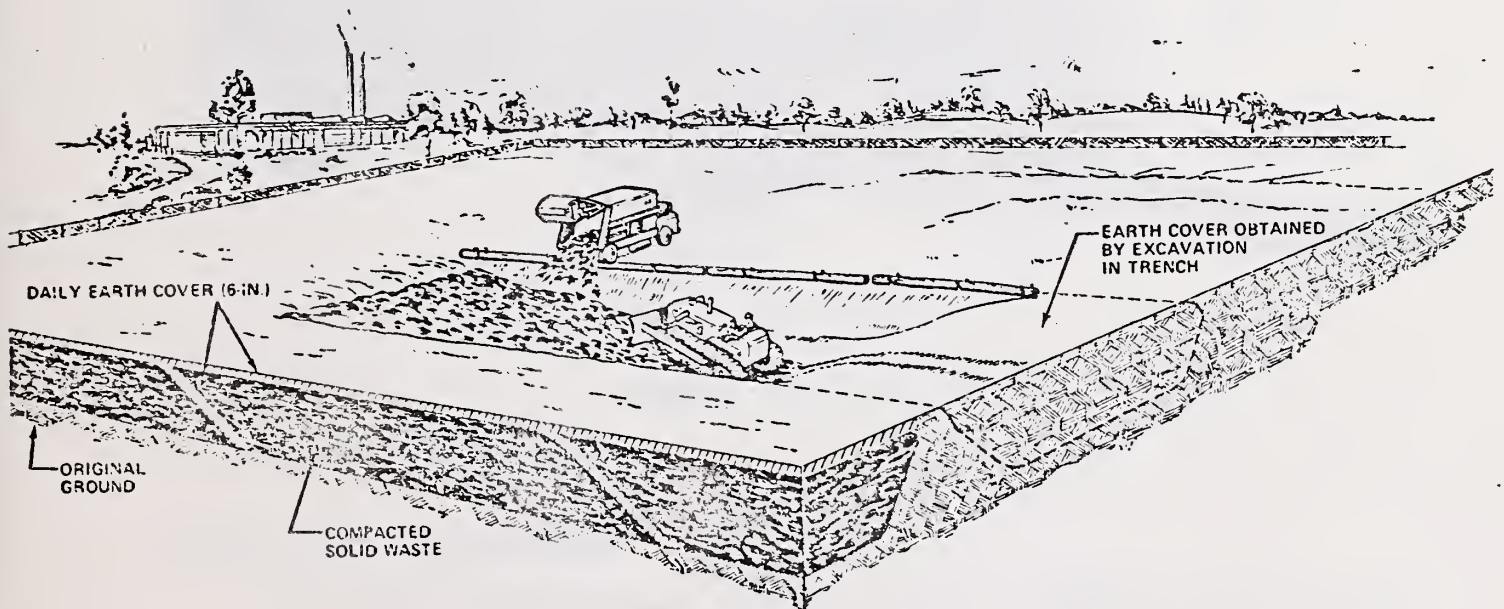


Figure 11.2.4

#### 11.2.5 Area Method Description

The area method sanitary landfill will consist of 16 acres. The site will be fenced to restrict unauthorized use. The fenced area will be a four-acre plot to reduce





initial costs. This fence can be moved after the area being fenced has been used for depositing solid wastes. The time interval between moves will be five years, making it necessary to move the fence every five years.

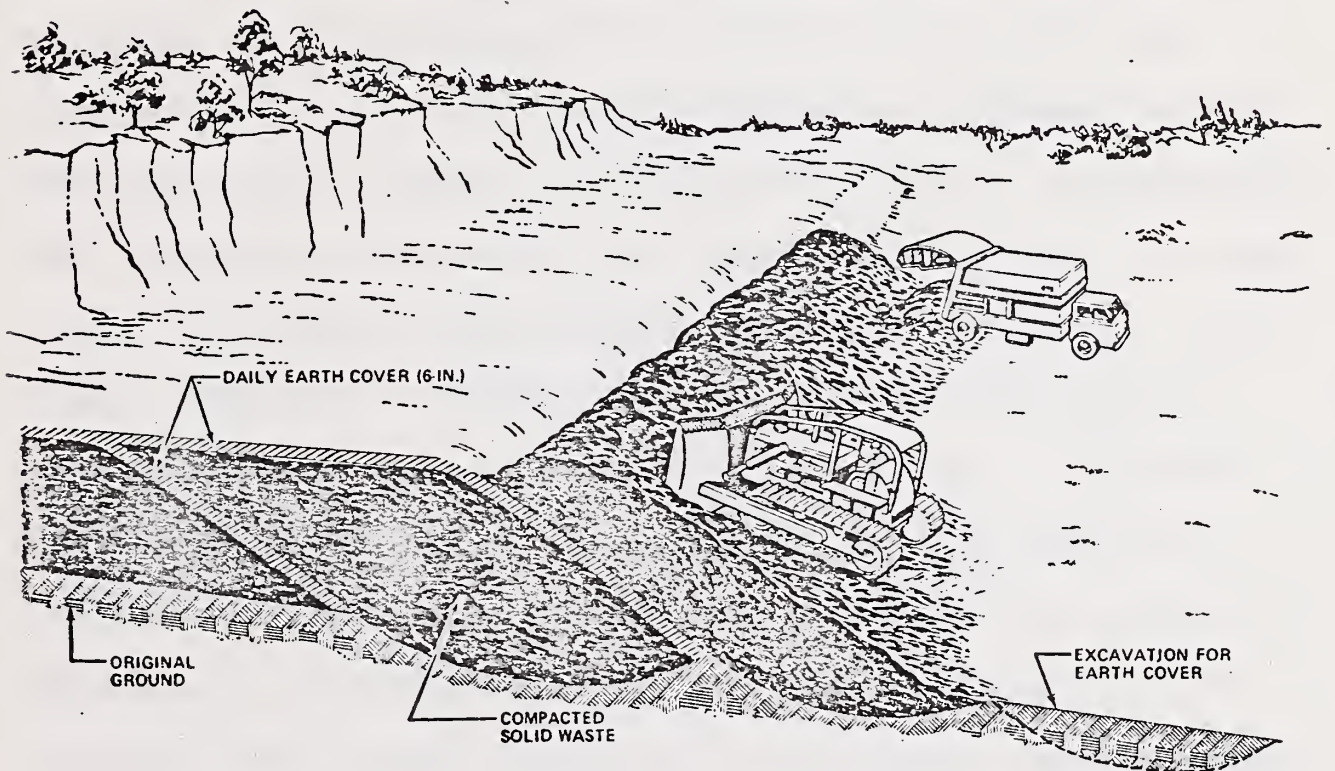


Figure 11.2.5

### 11.3 Cost Evaluation

The cost evaluation for methods of disposal have been broken into a number of alternatives. The alternatives selected for study are local sanitary landfill and transfer station methods of solid waste disposal.

As it has been stated before, it is important to realize that only costs which are affected by method changes will be considered in the analysis.





### 11.3.1 Cost Evaluation Data

The trench method would be fenced with six-foot security fence with three strands of barb wire at the top. The cost of this fence installed is \$8.00 per linear foot. The area fenced would serve as a disposal site for five years and the fence would be required to be moved after this time. Seeding should take place after the refuse disposal has been completed and the proper cover material placed. An equipment time evaluation determined that three to four hours, six days a week, of crawler tractor operation will be adequate. The mileage incurred in transit to the disposal site will be approximately 20 miles a day, five days a week. The cost per mile being 35 cents. Snow removal will be required at Site 2. For this study the period of snow removal will be three months with four removals per month. Refuse will be collected twice weekly during all times except summer months, which at that time will be collected three times weekly. In this study the equipment used for transfer hauling is located in Miles City. Transfer costs are 75 cents per mile when hauling.

### 11.3.2 Cost to Users

To absorb costs of the refuse disposal, fees will have to be charged for facility use. The costs of the proposed local sanitary landfill will increase approximately 100 percent over present methods. This evaluation is estimated for the projected average population for the next 20 years. The resulting fee would have an increase of approximately



50 percent over present, making the total cost \$3.75 per month for residents. The charges for commercial uses will increase at the same percentage.

Cost for the transfer method would increase total costs approximately 72 percent. Resulting fees for residents would be increased 21 percent, setting fees at approximately \$3.00 per month. The decrease in the percentage increase is caused by an increase in facility users.

#### Summary

##### Landfill method:

Present collection costs are approximately \$20.40

per ton or \$32,500/year

Present disposal costs are approximately \$15.00

per ton or 21,400/year

Total costs \$53,900/year

Proposed collection costs are less than

\$20.40 per ton or \$33,600/year

Proposed disposal costs are approximately

\$18.00 per ton or 42,000/year

Total costs for local landfill \$75,600/year



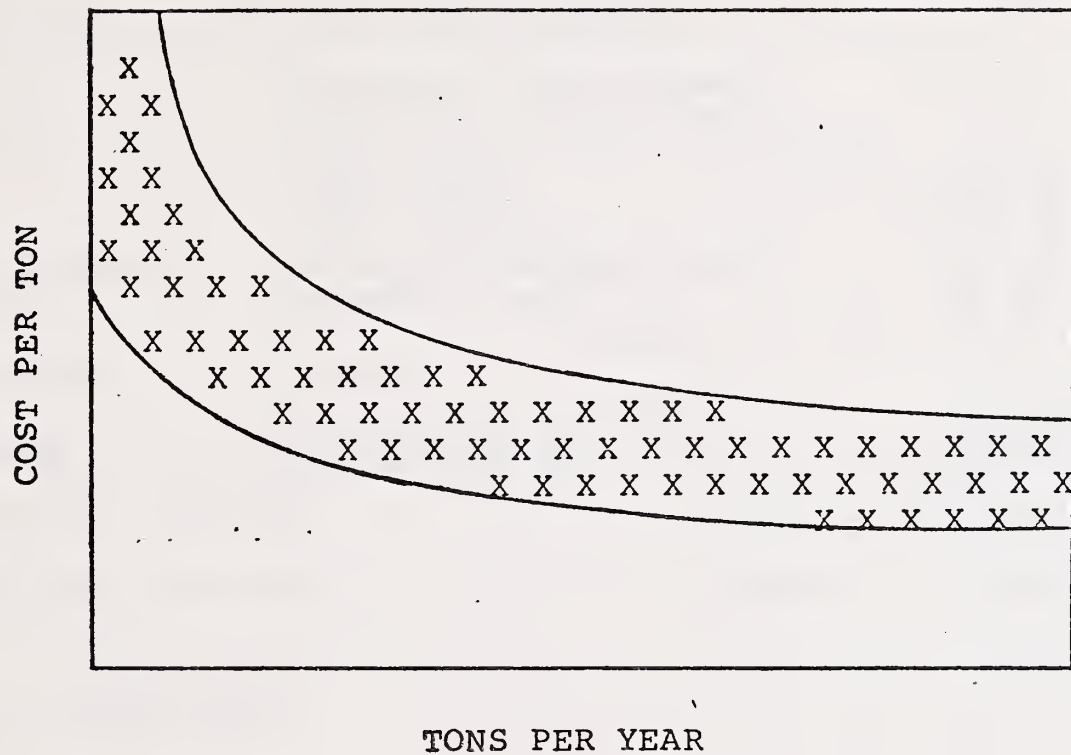


Figure 11.3.2





# SANITARY LANDFILL COST ANALYSIS:

## Trench Method - Site 1 or 2

Item	Description	20-year Cost	Yearly Amortized Cost
Land cost	18 acres - State owned	\$ 10,000	\$ 500
Security Fence	6 foot with 3 barb wire		
	1771 linear feet - 4.5 acres	14,167	708
Labor	1-man crew	241,140	12,057
Equipment	Cat @ \$22/hr.	480,480	24,024
Mileage for disposal	Travel to disposal site	27,300	1,365
*Snow removal	On site 2 only	16,800	840
	Site 2	42,000	2,100
Road Construction	Gravel		
	Site 1	32,340	1,617
Investment Cost	Interest @ 7%	33,582	1,679
<hr/>			
Site 1: Cost/ton = \$17.44	Total =	\$840,200	\$42,010
Site 2: Cost/ton = \$17.99	Total =	\$866,660	\$43,333

## Area Method - Site 1 or 2

Item	Description	20-year Cost	Yearly Amortized Cost
Land cost	16 acres	\$ 10,000	\$ 500
Fence	6-foot with 3 barb wire		
	1670 linear feet - 4 acres	13,357	668
Labor	1-man crew	241,140	12,057
Equipment	Cat @ \$22/hr.	480,480	24,024
Mileage for disposal	\$.35/mile - Travel to disposal site	27,300	1,365
*Snow removal	On site 2 only	16,800	840
	Site 2	42,000	2,100
Road Construction	Gravel		
	Site 1	32,340	1,617
Investment Cost	Interest @ 7%	33,562	1,678
<hr/>			
Site 1: Cost/ton = \$17.40	Total =	\$838,180	\$41,909
Site 2: Cost/ton = \$17.95	Total =	\$896,980	\$43,232

\* Snow removal will only concern Site 2.



Transfer Station Method

Colstrip

Item	Description	20-year Cost	Yearly Amortized Cost
Tractor	54,000 GVW	\$212,780	\$10,639
Storage trailer	Heil Transfer Trailer HT-75	104,000	5,200
Storage building	Including land & taxes	20,000	1,000
Charge by landfill	5/Ton	240,500	12,025
Investment		25,220	1,261
		<u>\$602,500</u>	<u>\$30,125</u>

Miles City

\$12.51/Ton

Item	Description	20-year Cost	Yearly Amortized Cost
Tractor	54,000 GVW	\$268,800	\$13,440
Storage trailer	Heil Transfer Trailer HT-75	104,000	5,200
Storage building	Land included, + taxes	20,000	1,000
Charge by landfill	5/Ton	240,500	12,025
Investment		25,220	1,261
Total		<u>\$658,520</u>	<u>\$32,926</u>

\$13.68/Ton



## GLOSSARY



## Glossary

Collection: The act of removing solid waste from the central storage point of a primary source.

Composting: Controlled decay of organic matter in a warm, moist environment by the action of bacteria, fungi, molds, and other organisms in either anaerobic and/or aerobic operation.

Cover Material: Soil that is used to cover compacted solid waste in a sanitary landfill.

Decomposition: The reduction of the net energy level and change in chemical composition of organic matter, as by microorganisms.

Dump: A land site where solid waste is disposed of in a manner that does not protect the environment.

Dumping: An indiscriminate method of disposing of solid waste, meaning the unloading or emptying of a container.

Food Waste: Animal and vegetable waste resulting from the handling, storage, sale, preparation, cooking, and serving of foods; commonly called garbage.

Garbage: See Food Waste.

Haul Distance: 1. The distance a collection vehicle travels from its last pickup stop to the solid waste transfer station, processing facility, or sanitary landfill. 2. The distance a vehicle travels from a solid waste transfer station or processing facility to a point of final disposal. 3. The distance that cover material must be transported from an excavation or stockpile to the working face of a sanitary landfill.

Haul Time: The elapsed or cumulative time spent transporting solid waste between two specific locations.

Incineration: The controlled process by which solid, liquid, or gaseous combustible wastes are burned and changed into gases and the residue produced contains little or no combustible material.

Junk: Unprocessed materials suitable for re-use or recycling.

Open Burning: Uncontrolled burning of wastes in the open or in an open dump.

Rubbish: A general term for solid waste - excluding for waste and ashes - taken from residences, commercial establishment, and institutions.





Sanitary Landfilling: An engineered method of disposing of solid waste on land in a manner that protects the environment, by spreading the waste in thin layers, compacting it to the smallest practical volume, and covering it with soil by the end of each working day.

Satellite Vehicle: A small collection vehicle that transfers its loads into a larger vehicle operating in conjunction with it.

Scavenger: One who participates in the uncontrolled removal of materials at any point in the solid waste stream.

Solid Waste: Useless, unwanted, or discarded material with insufficient liquid content to be free flowing.

Agricultural: The solid waste that results from the rearing and slaughtering of animals and the processing of animal products and orchard and field crops.

Commercial: Solid waste generated by stores, offices and other activities that do not actually turn out a product.

Industrial: Solid waste that results from industrial processes and manufacturing.

Institutional: Solid wastes originating from educational, health care, and research facilities.

Municipal: Normally, residential and commercial solid waste generated within a community.

Pesticide: The residue resulting from the manufacturing, handling, or use of chemicals for killing plant and animal pests.

Residential: All solid waste that normally originates in a residential environment. Sometimes called domestic solid waste.

Solid Waste Management: The purposeful, systematic control of the generation, storage, collection, transport, separation, processing, recycling, recovery, and disposal of solid wastes.

Storage: The interim containment of solid waste, in an approved manner, after generation and prior to ultimate disposal.



Appendix A

EXISTING CITY ORDINANCES  
RELATING TO SOLID WASTES



## CHAPTER 3

## GARBAGE

## SECTION: .

- 8-3- 1: Definitions
- 8-3- 2: Disposal of Garbage
- 8-3- 3: Garbage Collections
- 8-3- 4: Garbage Trucks
- 8-3- 5: Duty of Owner or Occupant
- 8-3- 6: Containers
- 8-3- 7: Garbage Fund
- 8-3- 8: Garbage Tax List
- 8-3- 9: Assessment of Garbage Tax
- 8-3-10: Extended Tax Assessment List
- 8-3-11: Council to Hear Objections
- 8-3-12: When Rooms Shall Constitute an Apartment
- 8-3-13: Rifling of Garbage Cans
- 8-3-14: Rules and Regulations

8-3-1: DEFINITIONS: The word "garbage" as used in this Chapter is intended to mean all refuse, animal and vegetable matter, ashes, store sweepings, paper and rubbish, and other waste matter, but shall not be construed to mean or include manure.

"Garbage" does not include waste products from building or other construction operations, such as lime, plaster, sand, concrete, or other refuse.

8-3-2: DISPOSAL OF GARBAGE: All garbage must be removed beyond the City Limits and consumed in a crematory provided for that purpose, or be otherwise disposed of in a manner approved by the Board of Health.

The collection, removal and disposal of garbage shall be done and performed under the supervision, direction, and control of the Street Commissioner and in strict conformity with the provisions of this Chapter and with the additional rules and regulations that may be made from time to time by the Council.





8-3-3: GARBAGE COLLECTIONS: In the charge of each district shall be placed a collector who shall be held responsible for the collection or removal of the garbage in his district in accordance with the provisions of this Chapter. Such collectors shall be paid such compensation as may from time to time be fixed by the Council. In time of emergency, the Street Commissioner may furnish the collector such assistance as may be necessary.

8-3-4: GARBAGE TRUCKS: It shall be optional with the Council whether the City shall own and supply to said collectors trucks used in the collection and removal of garbage, or require the same to be furnished by said collectors. All garbage trucks shall be of such style, size and description as the Council may from time to time require, and shall bear in prominent letters the words "City Garbage".

8-3-5: DUTY OF OWNER OR OCCUPANT: It shall be the duty of the owner or occupant of any premises within the City Limits to keep such premises and one-half (1/2) of the street and alley or avenue immediately adjacent thereto and also the gutter in front of or adjoining his property clean, open and free from any ashes, offal, wastepapers, cans, glass, broken ware, dirt, rubbish, filth, yard cleanings, garbage, barnyard litter, rank weeds, or any unhealthful stuff or material of any sort or kind. (Ord. 159; 1-7-43)

8-3-6: CONTAINERS: It shall be the duty of the resident householders, tenants, hotel-keepers, boardinghouse-keepers, retail dealers, and all other persons occupying business places and residences within the City to provide or cause to be provided, and at all times keep, or cause to be kept portable vessels or cans for holding garbage, which vessels or cans shall be water tight, with handles and covers. These vessels or cans shall not exceed two (2) bushels in size and shall be metallic. Such vessels or cans shall be placed upon racks or mounted at such elevations and in such fashion as the office of the City Engineer of the City of Forsyth, or the Council of the City of Forsyth, may, from time to time, direct. The purpose of placing such cans or vessels above ground level is to facilitate dumping, prevent animal invasion of garbage cans and to contribute to the sanitary condition of the City. Recipients of garbage service failing to comply with proper directives from the office of the City Engineer or the City Council as to the placement of garbage cans or vessels, may be denied service until such time as he, she or they comply.

All refuse, animal or vegetable matter, ashes, tin cans or other indestructible matter shall be deposited in the cans or vessels mentioned above and all waste paper to be removed by the City as garbage shall be placed in containers to be approved by the Council, the Street Commissioner, the City Engineer or the office of the Director of Public Works. (5-7-73; Eff. 6-7-73)



8-3-7: GARBAGE FUND: The expense of collecting, removal and disposition of garbage shall be paid for out of the garbage fund of the City. The cost of collecting garbage, exclusive of manure, from the streets, alleys, and private premises of the City shall in all cases be assessed and taxed against the real estate from which such garbage is deposited, and such property owner shall, as far as practicable, bear its share of the expense of collecting and disposing of the garbage in proportion to the amount of garbage deposited therefrom.

8-3-8: GARBAGE TAX LIST: The Street Commissioner shall prepare a list of all lots or parts of lots in the City upon which there are buildings or other improvements or cultivation necessitating the removal of garbage. Such lists shall show in connection with each building, except private residences, the nature of the business or occupation for which the same is used, and if used or occupied as an apartment house, the number of apartments into which it is divided. Said list shall also show the number of stories of each building, other than residences, and the character of business carried on, on the different floors of the building as far as necessary for fixing the rate of taxation hereinafter set forth. Such list shall be filed with the Clerk and constitute the list of lots upon which garbage taxes shall be collected each year.

It shall be the duty of the Street Commissioner each year on and before the first day of April to report to the Clerk a list of all lots or fractions of lots in the City not heretofore taxed, upon which buildings or improvements have been erected or constructed or cultivation done necessitating the removal of garbage since the last assessment, and any addition





to buildings or changes in the business carried on in the same, which shall effect the rate of taxation as hereinafter set forth, and the Clerk shall make the necessary additions and changes in the list of lots liable for garbage taxes on file in his office. (Ord. 159; 1-7-43)

8-3-9: **ASSESSMENT OF GARBAGE TAX:** For the purpose of garbage taxation, each fifty foot (50') frontage of the Northern Pacific Right-of-Way on Main Street shall be deemed the equivalent of one (1) regular City lot.

It shall be the duty of the Council to estimate as near as practicable the cost of collecting and disposing of garbage in the City and before the second Monday in August of each year, said Council shall pass and finally adopt a resolution levying and assessing a basic tax upon all lots, or portions of lots, occupied for business purposes (which shall include all purposes other than private residences) and a basic tax for all lots or portions of lots, occupied as private residences, other than apartment houses, from which garbage is removed, as in their opinion will be sufficient with the added percentages for uses and occupations, hereinafter set forth, to defray the cost of collection and disposing of garbage in the City. Basic tax on residences shall not be less than six dollars (\$6.00) and not more than fifteen dollars (\$15.00) and basic tax on business lots shall be not less than twelve dollars (\$12.00) and not more than thirty dollars (\$30.00).

The amount of basic tax per lot, occupied for business purposes, shall be a basic tax for lots on which are buildings not exceeding one (1) floor above the ground level, and for each additional story, over one (1) story, occupied for office or apartment purposes in any building, twenty-five per cent (25%) of the same shall be added to such basic tax, and for each additional story used for hotel or rooming house purposes, twenty per cent (20%) shall be added to such basic tax. For each lot or portion of lot whereon there is a public dining room, cafe, or restaurant, eating house, lunchcounter, or kitchen connected therewith, thirty-five per cent (35%) shall be added to the basic tax. For each lot or fraction of lot in such districts in which there is a dry goods store, a clothing store, printing office, grocery store or drug store, fifteen per cent (15%) shall be added to such basic tax. For each lot or portion of a lot on the ground floor of which there is a bank, office, store, or business house, not otherwise provided for, ten per cent (10%) shall be added to such basic tax. For each lot or portion of a lot on which there is a building occupied as an apartment house, for every apartment in excess of one (1) apartment per lot, there shall be added twenty-five per cent (25%) to such basic tax. (Ord. 176; 7-10-61)

8-3-10: **EXTENDED TAX ASSESSMENT LIST:** It shall be the duty of the Clerk <sup>7</sup> each year immediately after the passage of the resolution fixing the basic garbage taxes for the year shall have been introduced, to extend on the list of lots liable for the tax, the total amount to be taxed against each lot or portion of a lot under the provisions of this Chapter, and at least ten (10) days before the date set for final adoption, to publish in the official paper of the City a notice to all lot owners of the passage of said resolution, and time and place, when and where the resolution will come up for hearing of objections and final adoption, and that said list is on file in his office for inspection, and any person having any objections to offer, wherefore, said tax should not be levied and collected, shall file the same with the Clerk not less than fifteen (15) days from the date of said notice.



8-3-11:       **COUNCIL TO HEAR OBJECTIONS:** At the next regular meeting of the Council, after the expiration of the notice to lot owners prescribed in the preceding Section, the Council shall pass upon all objections filed and make such changes in the assessment as it shall find necessary and proper after hearing such objections, and thereafter the Clerk shall incorporate such changes in the list of taxes as extended by him and thereafter shall certify the taxes on such amended list to the Treasurer, to be by him collected in the same manner as other special taxes and assessments."

8-3-12:       **WHEN ROOMS SHALL CONSTITUTE AN APARTMENT:** For the purpose of this Chapter, two (2) or more rooms occupied together shall constitute an apartment, and nothing herein shall prevent the Council from permitting or requiring the owner, or occupant, of the premises to remove the garbage therefrom at his own expense under the supervision and control of the Street Commissioner, and exempting said premises from taxation hereunder.

8-3-13:       **RIFLING OF GARBAGE CANS:** It shall be unlawful for any person to rifle garbage cans or other containers for bottles or boxes or other material, and it shall be unlawful for any person to purchase such material if offered to him.

8-3-14:       **RULES AND REGULATIONS:** The Board of Health may make such other rules and regulations concerning the depositing, handling, removing, and disposition of garbage as they may from time to time deem fit and proper. (Ord. 159; 1-7-43)





## CHAPTER 4

## ANIMAL WASTES

## SECTION:

- 8-4-1: Removal Required
- 8-4-2: Manure Not to be Put with Garbage
- 8-4-3: City May Remove

8-4-1: **REMOVAL REQUIRED:** Every person, firm, or corporation owning or having control of one (1) or more of the following kinds of domestic animals, horses, mules, asses, cows, calves, steers, bulls, goats, sheep or hogs, and keeping such animals within the City, shall keep the premises upon which such animal or animals are kept free from accumulations of manure, and shall remove such manure from said premises at least twice during each calendar month, or more often, if required to do so by the Street Commissioner; and said Street Commissioner is hereby empowered to order removal of manure more often than twice in any calendar month by the owner or owners of property on which it may accumulate whenever in the judgment of the Street Commissioner, the removal thereof is for any reason desirable.

8-4-2: **MANURE NOT TO BE PUT WITH GARBAGE:** It shall be unlawful for any person, firm, or corporation keeping any animal or animals of the kinds hereinbefore enumerated within the City, to deposit manure in any street or alley of the City or to co-mingle or mix any such manure with any garbage placed in any alley of the City for removal by the City.

8-4-3: **CITY MAY REMOVE:** Should any person, firm, or corporation neglect or refuse to remove accumulations of manure from private premises after being ordered to do so by the Street Commissioner as provided in this Chapter, said Street Commissioner shall cause the same to be removed and shall certify the cost thereof to the Council and said Council shall thereafter, by resolution, levy and assess the cost thereof against the property from which said manure was so removed, and the Clerk shall transmit to the Clerk of Rosebud County a certified copy of such resolution. (Ord. 159; 1-7-43)



## CHAPTER 5

## REFUSE IN BUILDINGS; STAGNANT WATER

## SECTION:

## 8-5-1: Refuse in Buildings; Stagnant Water

8-5-1: REFUSE IN BUILDINGS; STAGNANT WATER: It shall be unlawful for any person to permit or suffer to be in or accumulate in, or upon any yard, lot, place or premises or upon any street or sidewalk adjacent to or abutting upon any lot, block place or premises or in any building or shed owned or occupied by him or for which he may be agent within the Limits of the City, any stagnant water or impure water, refuse, vegetable decay or decaying substance, garbage or filth of any kind, nor suffer such yard, lot, place, building, or premises to be or to remain in such condition as to cause or create a nuisance or offensive smell or to pollute or render unhealthful the atmosphere or the premises or thereby to be, become, cause or create a public nuisance. (1961 Code)



Appendix B

MONTANA DEPARTMENT OF HEALTH AND ENVIRONMENTAL SCIENCES  
STATE REGULATIONS FOR REFUSE DISPOSAL





Enacted and Amended by 1969 Session of Legislature

CONTROL OF REFUSE DISPOSAL AREAS

Section 69-4001.

It is hereby found and declared that the health and welfare of Montana citizens are being endangered by improperly operated refuse disposal areas. It is declared the public policy of this state to control refuse disposal areas to protect the public health and safety.

Section 69-4002. Definitions.

Terms used in this act shall be defined as follows:

- (1) "Garbage," putrescible animal and vegetable wastes resulting from handling, preparation, cooking and consumption of food.
- (2) "Refuse," all putrescible and nonputrescible solid wastes (except body wastes), including garbage, rubbish, street cleanings, dead animals, yard clippings and solid market and solid industrial wastes.
- (3) "Rubbish," nonputrescible solid wastes, consisting of both combustible and non-combustible wastes, such as paper, cardboard, abandoned automobiles, tin cans, wood, glass, bedding, crockery and similar materials.

Section 69-4003. Dumping in an unlicensed area is prohibited.

No person, partnership, company, or corporation shall hereafter dispose of any garbage, rubbish or refuse in any place except as permitted under this act.

Section 69-4004. Licenses required.

Each year each person, partnership, company or corporation desiring to operate a refuse disposal area shall obtain a license for operating same from the local, county, or district board of health having jurisdiction. To obtain a license to operate a disposal area, application to the local, county or district board of health having jurisdiction, must be made on forms provided by it. The application shall contain the name and residence of the applicant, the location of the proposed disposal area and such other information as the State Department of Health and Environmental Sciences may by regulation require. There shall be paid to the local, county or district board of health with each application for such license or for renewal of such license, an annual license fee of twenty-five dollars (\$25). This fee is to be deposited in the general fund of the county in which the refuse disposal area is to be located.

Section 69-4005. State Department of Health and Environmental Sciences to approve disposal area.

Upon receipt of the application, the local, county or district board of health having jurisdiction shall notify the State Department of Health and Environmental Sciences who will then cause to be made an inspection of the proposed site and determine if the proposed operation can comply with this act and rules and regulations adopted pursuant thereto. The State Department of Health and Environmental Sciences shall also inspect and approve plans which have been drawn up by the applicant for the creation of a refuse disposal area. When the State Department of Health and Environmental Sciences reports favorably upon the application, the



local, county or district board of health having jurisdiction may issue a license to the applicant. All licenses shall expire one year after issuance, but may be renewed upon payment of an annual fee of twenty-five dollars (\$25).

Section 69-4006.      Revocation of or refusal to renew license.

The local, county or district board of health having jurisdiction may revoke or refuse to renew any license after reasonable notice and hearing if it finds that the disposal area is not operated in a sanitary manner, as set forth by this law and by the rules and regulations adopted under this law.

Section 69-4007.      Rules and regulations--inspections and recommendations.

The State Department of Health and Environmental Sciences is authorized to promulgate rules and regulations for the operation of refuse disposal areas. Said regulations shall be prepared and published and shall contain sanitary standards for disposal areas. The State Department of Health and Environmental Sciences shall cause all licensed disposal areas to be inspected and recommend to the local, county or district board of health action which may be taken to enforce the provisions of this act.

Section 69-4008.      Landowner's rights preserved--publicly operated disposal areas.

This act shall not be construed to prohibit any person from disposing of his own garbage, rubbish or refuse upon his own land as long as such disposal does not create a nuisance. Any incorporated city, town, rural improvement district or county may establish a disposal area and operate same without paying the annual license fee, but must meet all other requirements of this act.

Section 69-4009.      Penalty for violations.

Any person violating this act or regulations prescribed by the State Department of Health and Environmental Sciences under this act, shall be guilty of a misdemeanor and, upon conviction, shall be fined not less than fifty dollars (\$50), nor more than five hundred dollars (\$500). Each day upon which a violation of this act occurs shall be considered a separate offense.

Section 69-4010.      Repeal of conflicting acts--acts preserved.

All acts and parts of acts in conflict herewith are hereby repealed, except that Section 32-1014 and Section 94-3542, R.C.M. 1947, shall in no way be affected by this act.





Adopted May 24, 1974

(1) Purpose. The following rule is adopted to set forth sanitary standards for refuse disposal areas and waste management.

(2) Definitions. In addition to the terms defined in Section 69-4002, R.C.M. 1947:

"Waste" means useless, unwanted, or discarded solid, semi-solid, or liquid materials.

"Hazardous waste" means any waste or combination of wastes which pose a substantial present or potential hazard to human health or living organisms because such wastes are nondegradable or persistent in nature or because they can be biologically magnified, or because they can be lethal, or because they may otherwise cause or tend to cause detrimental cumulative effects.

"Material" means a primary or raw material utilized in manufacturing a product and includes any secondary material that is or can be utilized in place of a primary or raw material.

"Generation" means the act or process of producing waste materials.

"Storage" means the interim containment of waste after generation and prior to ultimate disposal.

"Transport" means the movement of wastes from the point of generation to any intermediate transfer points, and finally to the point of ultimate disposal.

"Treatment" means any activity or processing designed to change the physical form or chemical composition of waste so as to render such materials non-hazardous.

"Disposal of waste" means the discharge, deposit, or injection of any waste into subsurface strata or excavations or the ultimate disposal of any waste onto the land.

"Disposal site" means the location where any final disposal of waste materials occurs.

"Treatment facility" means a location at which waste is subjected to treatment and may include a facility where waste has been generated.

"Person" means any individual, partnership, company, corporation, association, state, county, or municipality.

"Municipality" means a city, town, county, district, or other public body created by or pursuant to state law with responsibility for the planning or administration of waste management.

"Waste management" means the systematic control of the generation, storage, transport, treatment, recycling, recovery or disposal of waste materials.

"Department" means the department of health and environmental sciences.

(3) Waste classifications.

(a) Group I includes but is not limited to:



by the Environmental Protection Agency as  
hazardous, miscellaneous wastes which are noxious and must normally be excluded  
from sewage systems and waste water treatment processes.

(II) Brines, caustics, acids, heavy metals, pesticides, and synthetic organic  
chemical substances.

(III) Films and sediments caused by materials like oil sludges, used and  
wasted petroleum products.

(iv) Hospital, medical laboratory or other wastes that could contain pathogenic  
organisms.

(v) Excluding radioactive wastes and explosive wastes.

(b) Group II includes but is not limited to:

(i) Decomposable, organic materials or waste mixtures which contain organic  
materials.

(ii) Wood materials, such as brush and building demolition wastes.

(iii) Manure and other organic agricultural wastes.

(iv) Digested waste water treatment sludges and de-watered water treatment  
sludge.

(v) Excluding septic tank pumpings.

(c) Group III includes but is not limited to:

(i) Inert solid wastes, such as brick materials, concrete, rock and dirt.

(ii) Excluding industrial mineral wastes.

(4) Site classifications.

(a) A Class I site may accept all groups of waste. Class I sites shall not  
allow discharge of these materials or their by-products to ground or surface waters.  
These sites must either confine the wastes to the disposal site with no likelihood  
that the wastes will escape or they must be situated in a location where the  
leachate from the wastes can only percolate into underlying formations which have  
no hydraulic continuity with usable waters.

(b) Class II sites, suitable for receipt of Group II and III materials, must  
provide for separation of the Group II wastes from underlying or adjacent usable  
water. The distance of the required separation is established on a case-by-case  
basis, considering factors such as terrain, type of underlying soil formations,  
and natural quality of the groundwater.

(c) Class III sites, suitable for Group III wastes only, may contain water  
such as in marshy areas, deep gravel pits which contain exposed groundwater, or  
areas which may be periodically flooded, such as along stream flood plains.  
Class III sites shall not be located on the banks or in a live or ephemeral  
stream.

(5) Specifications for waste disposal sites.

(a) Class I sites. Operational plan, design, and location shall be approved  
by the solid waste management bureau of the department and any other agency or  
board it feels necessary in order to adequately protect the public health and





safety before approval of the site will be granted. The site geology, hydrology and climatology and soil conditions will be reviewed.

(1) May accept Groups I, II and III type wastes.

(ii) Site shall be fenced to prevent animals from roaming at large over the site.

(iii) Site shall be supervised during open hours.

(iv) Refuse shall be covered with six inches of compacted dirt at the end of each working day.

(v) Proximity to population centers shall be determined on a case-by-case basis by the department.

(b) Class II sites. Operational plan, design and location shall be approved by the solid waste management bureau of the department and any other agency or board it feels necessary in order to adequately protect the public health and safety before approval of the site will be granted. The site geology, hydrology, climatology and soil conditions will be reviewed.

(i) Shall receive Groups II and III wastes only.

(ii) Site shall be fenced to prevent animals from roaming at large over the site.

(iii) Water and waste water sludges are to be mixed with other wastes to prevent localized leaching.

(iv) Site shall be supervised during open hours.

(v) Refuse shall be covered with six inches of dirt at the end of each working day.

(c) Class III sites. Operational plan, design, and location shall be approved by the solid waste management bureau of the department and any other agency or board it feels necessary in order to adequately protect the public health and safety before approval of the site will be granted. The site geology, hydrology, climatology, and soil conditions will be reviewed.

(i) Shall receive Group III wastes only.

(ii) Shall be covered with dirt from time to time or when the department feels necessary to prevent site from being an eyesore.

(iii) Are to be located to allow for reuse of the land (land reclamation) and to preserve aesthetic values.

(6) Site selection.

(a) A sufficient acreage of suitable land shall be made available for the waste disposal area.

(b) Access roads and bridges shall be capable of supporting loaded trucks during all types of weather.

(c) The disposal area shall be so located as to prevent the pollution or contamination of any waters of the state.



(1) The department will cause to be made an inspection of the proposed site by a soils scientist and a department representative to determine if the proposed operation can comply with this rule.

(ii) Recognized safe distances between any source of public or private water supplies and the site shall be maintained.

(iii) The Class I and II sites shall not be subject to flooding by surface water or have a high groundwater table and shall not be located within a 100 year flood plain.

(iv) The site shall be located and the necessary drainage structures installed so that a natural drainage course does not direct the surface runoff through the refuse disposal area.

(v) Class I and II sites shall not be located where underlying geological formations contain rock fractures or fissures which might lead to pollution of underground waters.

(vi) The Class I and II sites shall not be located in areas where springs exist.

(d) The site should be located so that hauling distances are not too great so that there will be no tendency for persons to discharge refuse along the road to the site.

(7) Operation and maintenance.

(a) Any person who maintains or operates a refuse disposal area or permits the use of land as a refuse disposal area shall maintain and operate such area in conformance with the requirements of this section and all other local zoning, planning, building, and protective covenant provisions and any other legal restrictions that may be in effect for each refuse disposal site.

(i) Burning of refuse at a disposal area is prohibited unless a variance in writing is granted by the department.

(ii) Dumping of refuse shall be confined to an area which can be effectively maintained and operated in accordance with this rule. This shall be controlled by supervision, fencing, signs, or such other means unless an exemption in writing is granted by the department.

(iii) Waste at a refuse disposal area shall be compacted and covered at the end of each day of operation with a compacted layer of at least six inches of suitable earth cover material. Upon completion of the filling operation at the refuse disposal area, a final compacted cover of at least two feet of a suitable earth material shall be placed within one week after the final deposit of refuse at any portion of such refuse disposal area, unless an exemption in writing is granted by the department.

(iv) Effective means shall be taken to control flies, rodents, and other insects or vermin at a refuse disposal area to the extent that they shall not constitute a nuisance affecting public health.

(v) Fencing or other suitable means shall be used to confine papers or other refuse to the refuse disposal area.

(vi) The salvaging of refuse at refuse disposal areas, if permitted by the department, shall be conducted in such manner as not to create a nuisance or affect public health.





(vii) No hazardous wastes shall be accepted at the refuse disposal site unless specially marked in a manner predetermined by the landfill operator with the concurrence of the department.

(viii) Municipal incinerators shall be operated and maintained so as to be in compliance with Montana air pollution standards.

(ix) Pesticides, pesticide containers and residues shall be disposed of according to procedures set forth by the department.

(x) The Environmental Protection Agency publication "Sanitary Landfill Design and Operation" (SW-65ts) shall be used as the design and operation manual for purposes of this rule.

(8) Permit Required--Notice.

(a) Every person desiring to dispose of a hazardous waste in excess of 100 pounds or 30 gallons of formulated product and/or highly toxic, as set forth in guidelines of the department, shall first notify the department at least ten days in advance of the intended disposal date. The quantity of waste to be disposed of shall not be divided into lesser amounts which would have the effect of defeating the purposes of this section.

(b) The notice shall include:

- (i) Name and address of person desiring to dispose of waste.
- (ii) Proposed method and location of disposal.
- (iii) Description and quantity of waste to be disposed of.

(c) The department may refuse to concur with the method and location of disposal when it has reason to believe an imminent hazard will be created:

- (i) By the disposal of the waste involved, and/or
- (ii) By the method of disposal requested.

(d) The department may revise disposal methods to utilize the latest technology available. The department may require the hazardous waste to be taken to a different location for disposal when it has reason to believe an imminent hazard will be created at the proposed disposal site.

(e) The final disposal decision shall rest with the department.

(f) When the department has reviewed the notice, it shall notify the person desiring to dispose of a hazardous waste of its concurrence or revisions.

(g) Upon notification by the department, the person desiring to dispose of a hazardous waste shall conduct the disposal pursuant to the final disposal decision made by the department.

(9) Nuisances and hazards to public health.

(a) Where the operation of a refuse disposal area is conducted in such a manner as to constitute a nuisance or hazard to public health or be in violation of any statute or this rule, the department shall, on receipt of a complaint by any person, inquire into the facts concerning such operation. If it finds that the operation is in contravention of any statute or any section contained in this rule, it shall make and cause to be served personally or by certified mail upon the person operating the refuse disposal area a notice in writing stating the manner in which the operation contravenes such statute or section contained in this rule and specifying the





particular statute or rule contravened and ordering the person operating such refuse disposal area to correct or to cease such operation, depending on the nature of the violation. If the person served as aforesaid does not comply with the requirements of such order within the time specified therein, the department shall forthwith cause a report in writing containing a summary of the facts as disclosed by its inquiry, a recital of all action taken, and its recommendations, if any, to be transmitted to the department legal unit for such action as is authorized by law.



REFUSE DISPOSAL DISTRICTS

Title 69, Chapter 60

69-6001.

Declaration of purpose. The improper storage, collection and disposal of refuse is hereby declared to be a significant hazard to the health, safety and welfare of Montana citizens and can cause the spread of disease, air pollution and water pollution. Refuse can be an excellent habitat for disease vectors such as rats and insects; therefore, it is deemed necessary to provide for the creation of refuse disposal districts to control storage, collection and disposal of refuse.

69-6002.

Definitions. As used in this act unless the context indicates otherwise:

"Commissioners" means the board of county commissioners.

"Family residential unit" means the residence of a single family.

"Refuse" means all putrescible and nonputrescible solid wastes (except body wastes), including garbage, rubbish, street cleanings, dead animals, yard clippings, and solid market and solid industrial wastes.

"Refuse disposal district" means an area established with definite boundaries for the purpose of collecting and disposing of all refuse created in said district.

"Board" means board of directors as provided for in Section 69-6009, R.C.M., 1947, and Section 69-6012, R.C.M., 1947.

69-6003.

Creation of district authorized--cities and towns included--resolution of intention. Whenever it becomes necessary, the commissioners may create a refuse disposal district for the purpose of collection and/or disposal of refuse.

Cities and towns may be included in the district if approved by the city and town councils.

Before creating any refuse disposal district, the commissioners shall pass a resolution of intention so to do, which said resolution shall designate:

- (1) The proposed name of such district,
- (2) The necessity for the proposed district,
- (3) A general description of the territory or lands of said district giving the boundaries thereof,
- (4) The general character of the collection service,
- (5) The estimated cost thereof.





Action by city or town council -- effect -- notice. (1) Upon passage of such resolution of intention, the commissioners shall transmit a copy of the same to the executive head of any incorporated city or town within the proposed district for consideration by such city or town council, and if the city or town council shall by resolution concur, in the resolution of the commissioners, a copy of the resolution of concurrence shall be transmitted to the commissioners. If the incorporated city or town council does not concur in the resolution of the commissioners, the commissioners shall have no authority to include said town or city in the district, but may continue to develop the district, but excluding said town or city.

(2) The commissioners must give notice of the passage of the resolution of intention and resolution of concurrence, if applicable, a notice describing the general characteristics of the collection system and estimated costs; designating the time and place where the commissioners will hear and pass upon protests made against the operation of the proposed district; and stating that a description of the boundaries for the proposed district is included in the resolution on file in the county clerk's office. The notice shall be published in the newspaper published nearest to the place where the proposed district is to be created for ten (10) consecutive days in a daily newspaper or in two (2) issues of a weekly newspaper; posted in three (3) public places within the boundaries of the proposed district; and a copy mailed by first class mail to every person, firm, or corporation having real property within the proposed district listed upon the last completed assessment list for county taxes the same day the notice is first published.

Written protest--hearing--effect. At any time within thirty (30) days after the date of the first publication of the notice provided in section 69-6004, any owner of property liable to be assessed for said service may make written protest against the proposed service. Such protest must be in writing and be delivered to the county clerk, who shall endorse thereon the date of the receipt by him. At the next regular meeting of the commissioners, after the expiration of the time within which such said protest may be so made, the commissioners shall proceed to hear and pass upon all protests so made, and its decision shall be final and conclusive; provided, however, if the protest against the proposed service is made by the owners of more than fifty (50) per cent of the family residential units; each commercial and industrial service that is to be included in the collection system may be considered as a family residential unit for the purpose of determining per cent of protest; in the proposed district, no further proceedings shall be taken by the commissioners.

In determining whether or not sufficient protests have been filed in the proposed district to prevent further proceedings therein, property owned by the city, county, and school districts, shall be considered the same as any other property in the district. The commissioners may include commercial and industrial establishments in said district. The commissioners may adjourn said hearings from time to time.

Jurisdiction to order improvements -- passage of resolution -- brief description and reference. When no protests have been delivered to the county clerk within thirty (30) days after the date of the first publication of the notice provided in Section 69-6004, or when a protest shall have been found by said commissioners to be insufficient, or shall have been overruled, immediately thereupon, the



commissioners shall be deemed to have acquired jurisdiction to order improvements, but before ordering any of the said proposed improvements, the commissioners shall pass a resolution creating the said refuse disposal district in accordance with the resolution of intention theretofore introduced and passed by the commissioners.

In all resolutions, notices, orders, and determinations subsequent to the resolution of intention and notice of improvement, it shall be sufficient to briefly describe the work of the refuse disposal district and to refer to the resolution of intention for further particulars.

69-6007.

Service fees--maintenance assessments--disposal fee. To defray the cost of maintenance and operation of said refuse disposal district, the board shall establish a fee for service with approval of the county commissioners. This fee shall be assessed to all units in the district that are receiving a service for the purpose of maintenance and operation of said district. The fees shall be based upon a family residential unit, and fees for commercial and industrial accounts shall be based on the comparison with a typical residential unit as to volume and type of waste produced. In no case shall the fee for disposal service exceed one half (1/2) the total fee for both collection and disposal services. The month the service begins the county assessor shall place the amount of this fee on the tax notices to be collected with the tax. If a property owner fails to pay this fee, it shall become a lien upon the property. All fees and other monies received by the district shall be placed in a separate fund with the county treasurer of such county and shall be used solely for the purpose for which said refuse disposal district was created. Warrants upon such funds shall be drawn by the board of county commissioners upon presentation of claims approved by the board. Fees and other monies collected by joint county refuse disposal districts may be administered by one (1) county treasurer's office upon mutual agreement by the county commissioners of any joint refuse disposal district.

69-6008.

Installment payments for land and equipment--moneys from fee levy. To defray the initial cost of purchasing land and equipment, payments may be spread over a term of not to exceed twenty (20) years. Payments are to be made in equal installments out of the moneys received from the fee levy provided for in this act.

69-6009.

Board of directors--composition. Upon creation of any refuse disposal district, the commissioners shall appoint a board of directors for the proposed refuse disposal district. The board shall consist of not less than five (5) members, each of whom shall be property owners in the said district. The board shall consist of one (1) county commissioner, one (1) member from each incorporated city or town that is included in the district, one (1) member of the county or city-county board of health. The rest of the board shall consist of interested citizens distributed equally throughout the district. In those counties where full-time city-county health departments exist, the city-county board of health may be designated as the board of directors for the refuse disposal district.

69-6010.

Powers and duties of board. The board of every refuse disposal district established and organized under and by virtue of this act shall have the powers and duties with the approval of the county commissioners of all counties involved:





(1) To develop and administer a program for the collection and/or disposal of refuse within the district.

(2) To employ such suitable and competent assistants and employees as may be necessary and provide for their compensation.

(3) To purchase, rent or execute leasing agreements for such equipment and material as they may determine to be necessary for carrying on an effective refuse collection and/or disposal program.

(4) To cooperate with any corporation, association, individual or group of individuals, including any agency of the federal, or state, or local government, in order to carry out effective programs.

(5) To receive gifts, grants, or donations for the purpose of advancing the program; to acquire by gift, deed, purchase or condemnation land necessary for refuse disposal purposes.

(6) To enforce all state or local board of health rules and regulations pertaining to the storage, collection, and disposal of refuse.

(7) To apply for and receive from the federal government or the state government on behalf of said refuse disposal district any moneys that may be appropriated by federal or state legislative bodies for aiding such programs.

(8) To borrow from any loaning agency any funds available for assistance in planning or financing a refuse disposal district and repay the same with the moneys received from the fees levied provided for in this act.

(9) The board shall have the power to implement their proposed program, a section at a time. In the event that a program is implemented a section at a time, the fees may be levied only against that part of the district that is receiving the service. As the program is expanded throughout the district, that part of the district will start to pay the fee for service.

#### 69-6011.

Changes in boundaries. The governing body of the district may by resolution make such changes in the boundaries of said district as they shall deem reasonable and proper, following the same procedures of notice and hearings outlined under Section 69-6006 of this act.

#### 69-6012.

Joint districts. Joint refuse disposal districts are districts which encompass two (2) or more counties or parts thereof. A joint refuse disposal district may be created in the following manner: The commissioners of each county affected will create the district following the procedure as prescribed under Sections 69-6003, 69-6004, 69-6005, and 69-6006, R.C.M., 1947. The commissioners shall appoint a joint board of directors composed of at least five (5) members, each of whom shall be property owners in the said district. The board of directors for a joint district will consist of one (1) commissioner from each county involved, one (1) member from



each of the incorporated cities or towns that are included in the district, and one (1) member from each of the county or city-county boards of health. The rest of the joint board of directors shall consist of interested citizens distributed equally throughout the district, and the appointments shall be acceptable to all groups of county commissioners.

69-6013.

Duty of county attorney. The county attorney shall be the legal advisor of the refuse disposal districts and boards within the county of his jurisdiction and shall prosecute and defend all suits to which the districts may be a party. A district or board may employ special legal counsel to defend any such suits in the event a conflict of interest would prohibit such defense by county attorney.



## LITTER CONTROL

### LITTER CONTROL LAW

Amended by 1973 Session of Legislature

#### Section 94-3335. Legislative intent to prevent littering.

It is the intention of the legislature by this act to provide for uniform prohibition throughout the state of any and all littering on public and private property, and to curb thereby the desecration of the beauty of the state and harm to health, welfare and safety of its citizens caused by individuals who litter.

#### Section 94-3336. Littering public or private properties unlawful--exceptions.

It is unlawful for any person or persons to dump, deposit, throw or leave, or to cause or permit dumping, depositing, placing, throwing, or leaving of litter on any public or private property in this state, or any waters in this state, unless:

- (1) Such property is designated by the state or by any of its agencies or political subdivisions for the disposal of such material, and such person is authorized by the proper public authority to use such property;
- (2) Into a litter receptacle or container installed on such property;
- (3) He is the owner or tenant in lawful possession of such property, or has first obtained consent of the owner or tenant in lawful possession, or unless the act is done under the personal direction of said tenant or owner.

#### Section 94-3337. Litter defined.

The term "litter" as used herein shall mean all rubbish, waste material, refuse, garbage, trash, debris or other foreign substances of every kind and description, including abandoned motor vehicles.

#### Section 94-3338. Public or private property defined.

The phrase "public or private property" as used herein shall include, but not be limited to, the right of way of any road or highway; any body of water or watercourse or the shores or beaches thereof; any park, playground, building, refuge or conservation or recreation area, and any residential or farm properties or timberlands.

#### Section 94-3339. Penalties.

Any person violating the provisions of Section 94-3336 of this act is guilty of a misdemeanor, subject to a minimum fine of twenty-five dollars (\$25) or imprisonment, or both, as in the case of misdemeanors, and, in lieu thereof, in the sound discretion of any court in which conviction is obtained, may be directed by the judge to pick up and remove from any public street or highway or public and private right of way, or public beach or public park, or, with prior permission of the legal owner or tenant in lawful possession of such property, any private property upon which it has been established by competent evidence that he has deposited litter, any and all litter deposited thereon by anyone prior to the date of execution of sentence.







Section 94-3340. Prima facie violation by operators of conveyances.

Whenever litter is thrown, deposited, dropped or dumped from any motor vehicle, boat, airplane or other conveyance in violation of Section 94-3336 hereof, the operator of said conveyance shall be deemed prima facie to have violated this act.

Section 94-3341. Who authorized to enforce act.

All law enforcement agencies, officers and officials of this state or any political subdivision thereof, or any enforcement agency, officer or any official of any commission of this state or any political subdivision thereof, are hereby authorized, empowered and directed to enforce compliance with this act.

Section 94-3342. Public authorities to maintain receptacles in public places.

All public authorities having supervision of properties of this state are authorized, empowered and instructed to establish and maintain receptacles for the deposit of litter at appropriate locations where such property is frequented by the public, and to post signs directing persons to otherwise publicize the availability of litter receptacles and requirements of this act.

Section 94-3343. Short title.

This act shall be known as the litter control law.

Section 94-3344. Notices of act and penalties posted on highways.

It is the duty of the Department of Highways to post notices of this act, and the penalties provided for, on the state and interstate highways at locations to be designated by the Department of Highways.

LOSS OF HUNTING PRIVILEGES UPON CONVICTION OF LITTERING

Amended by 1973 Session of Legislature

Section 26-812. Forfeiture of license or permit for littering.

Any holder of a Montana resident or nonresident fishing or hunting license, or camping permit convicted of littering campgrounds, public or private lands, streams, or lakes while hunting, fishing or camping shall forfeit his license and privilege to hunt, fish, camp or trap within Montana for a period of one (1) year from the date of conviction. Any person who hunts, fishes, camps or traps in Montana while such license and privilege are suspended is guilty of a misdemeanor.

DUMPING GARBAGE ON HIGHWAYS

Section 32-4410.

- (1) It shall be unlawful to dump or leave any garbage, dead animal, or other debris or refuse:





